APPLYING KNOWLEDGE MANAGEMENT THEORY TO ARMY DOCTRINE DEVELOPMENT: CASE STUDY OF A WEB-BASED COMMUNITY OF PRACTICE

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

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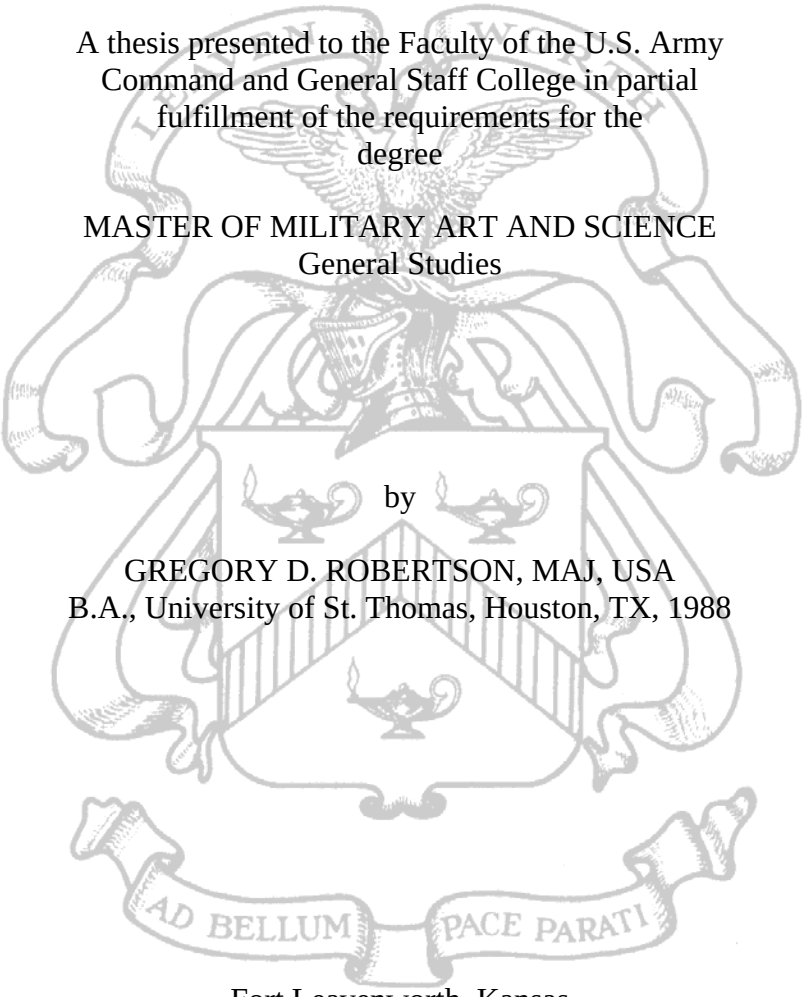
by

GREGORY D. ROBERTSON, MAJ, USA
B.A., University of St. Thomas, Houston, TX, 1988



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The study addresses the question of whether knowledge management is an appropriate strategy for revising the Army doctrine development process in the contemporary operational environment. Case study examines knowledge management theory as applied to the proposed web-based Army Field Manual (FM) 7-1, *Battle Focused Training*, and then compares the case study to the Army's doctrine development process. Discussion addresses three knowledge management theories, and develops principles of knowledge management from two of the knowledge management theories. The thesis concludes that knowledge management provides only a partial solution for the problem of consistency and timeliness of the doctrine development process, and that knowledge management does not solve the problem of validating and testing doctrine. The thesis proposes Chris Argyris' theory of double-loop learning and knowledge management as a means to solve the problem of validation as well as consistency and timeliness of doctrine development.

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Thesis Title: Applying Knowledge Management Theory to Army Doctrine Development: Case Study of a Web-based Community of Practice

Approved by:

_____, Thesis Committee Chair
Thomas G. Clark, Ph.D.

_____, Member
COL Timothy R. Reese, M.A.

_____, Member
Steven M. Carmichael, M.A.

Accepted this 14th day of December 2007 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, Ph.D.

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ABSTRACT

APPLYING KNOWLEDGE MANAGEMENT THEORY TO ARMY DOCTRINE DEVELOPMENT: CASE STUDY OF A WEB-BASED COMMUNITY OF PRACTICE, by Gregory D. Robertson, 102 pages.

The study addresses the question of whether knowledge management is an appropriate strategy for revising the Army doctrine development process in the contemporary operational environment. Case study examines knowledge management theory as applied to the proposed web-based Army Field Manual (FM) 7-1, *Battle Focused Training*, and then compares the case study to the Army's doctrine development process. Discussion addresses three knowledge management theories, and develops principles of knowledge management from two of the knowledge management theories. The thesis concludes that knowledge management provides only a partial solution for the problem of consistency and timeliness of the doctrine development process, and that knowledge management does not solve the problem of validating and testing doctrine. The thesis proposes Chris Argyris' theory of double-loop learning and knowledge management as a means to solve the problem of validation as well as consistency and timeliness of doctrine development.

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TABLE OF CONTENTS

Page

ACRONYMS

AKO	Army Knowledge Online
BCKS	Battle Command Knowledge System
CADD	Combined Arms Doctrine Directorate
CALL	Center for Army Lessons Learned
CIDS	Capabilities Integration and Development System
COE	Contemporary Operational Environment
CSA	Chief of Staff of the Army
DoD	Department of Defense
DOTMLPF	Doctrine, Organization, Training, Materiel, Leader Development, Personnel, and Facilities
FM	Field Manual
FMI	Field Manuals Interim
GWOT	Global War on Terrorism
IT	information technology
KM	Knowledge Management
PD	Program Directive
SME	Subject Matter Experts
TRADOC	US Army Training and Doctrine Command
TTPs	Tactics, Techniques, and Procedures
US	United States
USATSC	US Army Training Support Center

ILLUSTRATIONS

Page

TABLES

Page

CHAPTER 1

INTRODUCTION

> If one were to attempt to characterize the nature of how the Department of Defense is transforming and how the senior leaders of this Department view that transformation, it is useful to view it as a shift of emphasis to meet the new strategic environment. From an emphasis on ships, guns, tanks and planes--to focus on information, knowledge and timely, actionable intelligence.[1]
>
> *Quadrennial Defense Review Report*

The question remains, it will not go away--is the Army doctrine development strategy appropriate for the times? Since the collapse of the Soviet Empire in 1989 and the rise of global terrorism, the US Army is facing an operational environment that is changing at an increasingly rapid pace. The new challenges of this era are captured in the National Defense Strategy of March 2005.[2] The challenges include irregular threats such as insurgent and terrorist forces, traditional threats (nation state militaries), catastrophic threats, and disruptive threats like computer cyber attacks or other technology based threats.

The National Defense Strategy called for a process of "defense transformation,"[3] that involves developing US capabilities to counter existing threats and to posture the military to face emerging threats. A critical component of this transformation is the call for "network-centric operations."[4] This means the creation of an integrated and networked force utilizing the advances in information and communications technologies in order to provide "all users access to the latest, most relevant, most accurate information."[5] The intent is to provide not only better information but to transform and improve command and control, intelligence functions, joint and combined forces

interoperability, in order to provide "the necessary speed, accuracy and quality of decision-making critical to success."[6]

The Army's response to the changes in the threat has been the development of new strategy and force structures to defeat these multiple threats and to transform the Army to face threats of the future. According to Army Regulation 25-1, "Army Knowledge Management is the Army's strategy to transform itself into a net-centric, knowledge-based force and an integral part of the Army's transformation to achieve the Future Force."[7] The aim of the strategy is to provide better information access and sharing "while providing 'infostructure' capabilities across the Army so that warfighters . . . can act quickly and decisively. The end result of the Army Knowledge Management strategy is to manage the Army infostructure as an enterprise and to align the Army with the Global Information Grid (GIG) and the Future Force."[8] The intent is to leverage new technology to better exploit the knowledge of Soldiers and leaders, as well as communication and information storage and retrieval systems, so that the Army has "the right information at the right time, and to deliver it to the right customer."[9] The Army's infostructure is the sum of all information and communications technology and systems used in the Army. The Future Force is the planned force structure the Army will have through the process of transformation. The Global Information Grid is the sum of all information and communication technology systems employed around the world.

According to Dean Call,[10] Army doctrine development and Army Knowledge Management are poorly networked and integrated because TRADOC (US Army Training and Doctrine Command) knowledge management efforts have failed. TRADOC has not followed the principles of knowledge management. Call contends that TRADOC

Knowledge Management efforts have failed because the principles of knowledge management have not been applied. If these two processes are not integrated, the Army risks creating redundant systems for both processes, and will fail to leverage existing and emerging technology, organizations, and knowledge. In addition, the Army will fail to develop new knowledge and knowledge capabilities to achieve the Army Knowledge Management strategy's goals of information dominance, developing a learning organization, creating new communities of practice, and correcting inefficient and redundant systems.

Due to rapid changes in the Contemporary Operational Environment (COE), the Global War on Terrorism (GWOT), as well as Campaigns in Iraq and Afghanistan, and changes in the Army force structure, Army Doctrine development has difficulty keeping pace with the changes. The current doctrine development process takes about two years to produce a manual.[11] Often there are delays of several years or more in publishing updates and revisions to Army doctrine manuals.[12] While the enemy, tactics, technology, and strategy, have changed dramatically since the Cold War, doctrine manuals are developed in a process dating back to World War II. Doctrinal manuals still take years to update and revise. By the time doctrine is revised and published, it is often outdated because of changes in practice, technology, and the threat. As a result, current doctrine forces units in the field to develop doctrine, which causes dramatic differences in operations across the Army.

Problem Statement

TRADOC and CADD (Combined Arms Doctrine Directorate) have offered initiatives to improve the doctrine development process in various ways but without great

success. These initiatives include Field Manuals Interim (FMI) and draft version field manuals as attempts to provide a faster means of delivering doctrine revisions. The FMIs contribute to the problem by introducing new concepts and terms, which often conflict with the existing doctrine. FMIs are only "valid" for two years.[13] During the FMI period, existing doctrine remains the official and approved doctrine. In addition, these FMIs are provided to Army schools and commands with scant instruction on revisions to existing manuals. The result is more confusion in the schools and the tendency to avoid teaching the FMIs because the curriculum cannot be changed fast enough. The implication is that the longstanding doctrine development process causes Army doctrine to become ineffective. The problem is that the longstanding strategy to develop and disseminate doctrine is no longer adequate for a fast-paced, ever-changing operational environment.

Furthermore, the lack of current doctrine has resulted in the creation of some official websites like Company Commander.com, Platoon Leader.com, the Reimer Digital Library and a host of other sites. To exacerbate the problem, most of the websites are not networked and integrated with each other through hyper-links based on key terms and symbols. The websites operate outside the standards for doctrine development, and lack doctrine writer expertise. The Army has created "knowledge" websites on its Battle Command Knowledge System (BCKS--a network community of websites and professional discussion forums) that provide some new doctrine in the form of tactics, techniques and procedures but these have largely failed or are poorly used. The knowledge sites have incorporated websites like CompanyCommander.com and others but they are not managed by doctrine authors but by BCKS. The knowledge sites offer peer collaboration and some expert advice but their focus is not on revising and updating

doctrine, which is the Army's knowledge. Finally, Dean Call contends that TRADOC has failed in its attempts at applying knowledge management because TRADOC has not used the principles of knowledge management.[14]

Research Questions

Primary: Is knowledge management an appropriate strategy for Army doctrine development to keep pace with the rapid changes in the COE and force structure?

Secondary: (1) What is the current doctrine development process? (2) How are doctrine and knowledge management related?

Definition of Key Terms

Community of practice: "Groups of people who share a passion for something that they know how to do, and who interact regularly in order to learn how to do it better."[15]

Doctrine: Defined in many ways but for this thesis it is, "teaching, instruction . . . a principle or position or the body of principles in a branch of knowledge . . . a military principle or set of strategies."[16]

Knowledge: Is also defined in many ways but for this thesis it is "the circumstance or condition of apprehending truth or fact through reasoning: cognition . . . the fact or condition of having information or of being learned . . . the body of truth, information, and principles acquired by humankind."[17]

Knowledge management: Theories and practices regarding how organizations "evaluate and transfer knowledge . . . [and] what forms does knowledge take."[18]

Assumptions

There are several key assumptions for this thesis. First, Army Knowledge Management (KM) is a valid theory and concept for transferring, storing, retrieving, and creating knowledge for an organization. In order for a knowledge management theory to be valid it must define knowledge. Second, Army doctrine will remain the Army's primary source of knowledge. Third, Army doctrine is the foundation and starting point for the process of transformation in the Army.

Limitations and Delimitations

This study is limited to the single case study of FM 7-1, *Battle Focused Training*. It is the only Army field manual, which is using the tools and processes of knowledge management. In addition, the study was limited by lack of access to primary sources for knowledge management and interviews with current theorists. The study is limited by the contemporary nature of knowledge management theory. There are divergent views on the nature, scope, and application of knowledge management and no single theory and set of principles have been established as standard practice. Finally, information cutoff prior to full implementation of the web-based format used in the case prevented further analysis.

Significance of Study

If the Army fails to successfully revise its old and ineffective doctrine development process, doctrine may lose relevance as the source for how leaders think about the design and plan for operations. The current doctrine development process will result in diminished relevance and consistency of key doctrine manuals for units in the field. There is less and less time to train, plan, and prepare operations. Units and leaders

will continue to develop doctrine, which will increase the disparity in operations between different units. The result will be loss of unity of command and effort. Additionally, leaders will seek other sources of doctrine, increasing the demand on existing websites and on doctrine writers to improve the speed of delivery of doctrinal knowledge. The demand for more current doctrinal knowledge may be met through a better networked and integrated system of doctrinal knowledge. By changing the doctrine development process and knowledge management strategy into a single vision and strategy the Army will achieve the "network-centric," decision dominance, and information superiority the Army seeks. Doctrine will maintain its relevance and anticipate changes in strategy, threat, and technology. Finally, the Army will develop a learning organization that creates and delivers the knowledge needed at the right time.

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[1]Office of Secretary of Defense, *Quadrennial Defense Review Report* (Washington, DC: Government Printing Office, 2006), vi-vii.

[2]The White House, *National Defense Strategy of the United States of America* (Washington, DC: Government Printing Office, 2005), 2.

[3]Ibid., 11.

[4]Ibid., 14.

[5]Ibid.

[6]Ibid.

[7]Headquarters, Department of the Army, Army Regulation 25-1, *The Army Knowledge Management and Information Technology* (Washington, DC: Government Printing Office, 2005), 2.

[8]Ibid.

[9]Ibid.

[10]Dean Call, "Knowledge Management--Not Rocket Science," *Journal of Knowledge Management* 9, no. 2 (2005): 19-30.

[11]Headquarters, Department of Army Training and Doctrine Command, Training and Doctrine Command (TRADOC) Regulation 25-36, *The TRADOC Doctrinal Literature Program* (Fort Monroe, VA: Government Printing Office, 2004), 21.

[12]Army Field Manual 3.0, *Operations* is currently under revision and has had multiple drafts, and remains unapproved as of October 2007.

[13]Headquarters, Department of Army Training and Doctrine Command, TRADOC Regulation 25-36, 23.

[14]Call, 21.

[15]Etienne Wenger, "Knowledge Management as a Doughnut: Shaping Your Knowledge Strategy Through Communities of Practice," *Ivey Business Journal* (January-February 2004), http://www.iveybusinessjournal.com/view_article.asp?int Article_ID=465 (accessed 15 September 2007).

[16]*Merriam-Webster On-line Dictionary*, Definition of Doctrine, http://www.merriam-webster.com/dictionary/doctrine (accessed on 5 October 2007).

[17]*Merriam-Webster On-line Dictionary*, Definition of Knowledge, http://www.merriam-webster.com/dictionary/knowledge (accessed on 5 October 2007).

[18]Haidee E. Allerton, "KM Today--Laurence Prusak Discusses Knowledge Management--Interview" (July 2003), http://findarticles.com/p/articles/mi_m0MNT/is_7_57/ai_105096154 (accessed 30 September 2007).

CHAPTER 2

LITERATURE REVIEW

> Doctrine is vital to developing concepts of war, education, training, organization, and warfighting. The development of AirLand Battle in the Army provides a case study of doctrine as an engine of change. Moreover, doctrine is more than the sum of its parts. It lives and breathes into plans and battles, beyond the visions of those who developed and produced it. Success in doctrine is about victory in future war.[1]
>
> Stephen J. Cimbala,
> "Joint Doctrine--Engine of Change?"

The framing question for this study was to explore whether the Army doctrine development process is right for times. The aim of the literature review is to describe a framework to examine the doctrine development process. The literature review has five major sections. The first section deals with the definitions associated with doctrine in Army manuals. The second section sources explain the purpose Army doctrine serves. The third section sources describe the doctrine development process. The fourth section sources introduce knowledge management as an alternative organizing principle for the doctrine development process. The final section is a summary of the literature review.

Army Doctrine: Definition

The sources in this section provide a range of working definitions for the primary term of this study--doctrine. A seminal definition of doctrine states that doctrine is a body of principles in a specified knowledge or belief system based on past decisions.[2] The following discussion concerning doctrine definitions comes from table 1. Doctrine writers in 1993 defined doctrine as fundamental principles that shape military actions and, while authoritative, are guidelines that shape thinking rather than rules to be

enforced.[3] In 2001, writers crafted a definition that incorporated a joint services perspective. The 2001 version of FM 3-0, *Operations*, stated that Army doctrine is complementary to joint doctrine and that Army doctrine encapsulated Army contributions to land operations. As in previous definitions, the 2001 definition presented Army doctrine as authoritative rather than prescriptive. The 2001 definition furthermore reinforced the concept that in the case of conflicts between Joint and Army doctrine, Joint doctrine prevails.[4] In 2004, the writers of FM 1-02, *Operational Terms and Graphics*, defined doctrine as fundamental principles that guide the employment of military forces to achieve national objectives. In 2005, the writers of FM 1, *The Army*, reinforced the concept of doctrine as a guide to action. The writers also emphasized that doctrine provides a common frame of reference to standardize military operations. In the 2006 edition of FM 3-24, *Counterinsurgency*, writers defined doctrine as having a broad scope to incorporate principles as well as best practices from the field in tactics, techniques, and procedures (TTPs) that have worldwide application. In a 2007 draft revision of FM 3-0, writers again emphasized that doctrine contains an accumulated body of knowledge on how Army forces contribute and operate in joint operations.

Table 1. The Definition of Doctrine

Doctrine Development Process	FM 100-5, 1993 Capstone	FM 3-0, 2001 Capstone	FM-1, 2005 Capstone	FM 3-0 Draft, June 2007 Capstone
Definition of Doctrine	"Fundamental principles by which military forces guide their actions in support of national objectives. Doctrine is authoritative but requires judgment in application."[5]	"Doctrine is the concise expression of how Army forces contribute to unified action in campaigns, major operations, battles, and engagements. While it complements joint doctrine, Army doctrine also describes the Army's approach and contributions to full spectrum operations on land. Army doctrine is authoritative but no prescriptive. Where conflicts between Army and joint doctrine arise, joint doctrine takes precedence."[6]	"The concise expression of how Army forces contribute to campaigns, major operations, battles, and engagements. It is a guide to action, not hard and fast rules. Doctrine provides a common frame of reference across the Army. It helps standardize operations, facilitating readiness by establishing common ways of accomplishing military tasks. Standardization means that Soldiers transferring between units do not need to learn new ways to perform familiar tasks."[7]	"Army doctrine is a body of thought on how Army forces intend to operate as an integral part of a joint force. Doctrine focuses on how to think--not what to think. It establishes the following: How the Army views the nature of operations (conflict is a chaotic environment with fog and friction ever-present). Fundamentals by which Army forces conduct operations (simultaneous offensive, defensive, and stability or civil support operations). Methods by which commanders exercise command and control (mission command as opposed to detailed command) . . . it consists of-- • Fundamental principles. • Tactics, techniques, and procedures (TTP). • Terms and symbols."[8]

Doctrine Development Process	FM 1-02, 2004 Keystone	FM 3-24, 2006 Keystone	Joint Pub 1-02, June 2007 Joint Doctrine
Definition of Doctrine	"Fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application. (NATO) Fundamental principles by which the military forces guide their actions in support of objectives. It is authoritative but requires judgment in application."[9]	"Doctrine by definition is broad in scope and involves principles, tactics, techniques and procedures applicable worldwide."[10]	"Fundamental principles that guide the employment of US military forces in coordinated action toward a common objective. Joint doctrine contained in joint publications also includes terms, tactics, techniques, and procedures. It is authoritative but requires judgment in application."[11]

The 2007 definition in the draft FM 3-0, Operations, also carried forward the long-standing aphorism that doctrine deals with how to think rather than what to do. The 2007 draft manual incorporated the FM 3-24, *Counterinsurgency*, (2006) expansive definition with the concept of "best practices" or TTPs that develop from field operations. Tactics are defined as "the employment and ordered arrangement of forces in relation to each other."[12] Techniques are "non-prescriptive ways or methods used to perform missions, functions, or tasks."[13] Procedures are "standard, detailed steps that prescribe how to perform specific tasks."[14] These definitions form the basis for the structure and development of doctrine. Doctrine also provides a "comprehensive view of capabilities leading toward a desired end state."[15]

In 2007, Joint Publication 1-02 writers carried forward the definition that doctrine contains foundation principles and TTPs, which deal with coordinating military forces toward a common objective. Joint doctrine embraces the definition that establishes doctrine as being authoritative without supplanting the need for leaders to apply judgment in practice.

In summary, doctrine is a body of knowledge that practitioners in a professional field develop over time. Doctrine represents foundational knowledge, time-tested principles, as well as emerging best practices (or TTPs) that guide practice from entry level to the most experienced members of a specified profession. Over time, military doctrine writers repeat the importance that doctrine is more a guide than a prescription or checklist of activities. Thus, doctrine is a body of knowledge that informs practice. As a body of knowledge, doctrine is dynamic in nature. Doctrine incorporates a set of theories and principles that leaders must master to understand how to orchestrate military power

in achieving national objectives. The unavoidable conclusion becomes that as a dynamic body of professional knowledge, doctrine has value in direct relationship to timely dissemination to practitioners. Given a practical definition for doctrine, the next section deals with how leaders apply doctrine--the purpose of doctrine.

Army Doctrine: Purpose

The sources in this section describe the purpose of Army doctrine from perspectives of doctrine writers (see tables 2 and 3) and senior leaders. Writers frame doctrine as the "heart" of the Army's "professional competence." Drawing from table 2, FM 100-5, *Operations*, in 1993 outlined doctrine as an "authoritative guide" to describe "how the Army thinks about the conduct of operations," while adding that the doctrine "undergirds" all the elements of the DOTMLPF (doctrine, organization, training, materiel, leader development, personnel, and facilities).[16]

In FM 3-0, *Operations*, 2001, writers noted that doctrine serves a purpose to provide common terms to communicate concepts, contributes to a professional culture that frames a community of practice (Soldiers), and provides a foundation for core curriculum in professional military education.[17] FM 1-02 in 2004, along with Joint Publication 1-02 in 2007, highlighted the critical purpose doctrine meets in establishing consistent definitions for terms, graphics, and symbols to ensure consistent meaning to like concepts.[18]

Table 2. The Purpose of Doctrine

Doctrine Development Process	FM 100-5, 1993 Capstone	FM 3-0, 2001 Capstone	FM 1, 2005 Capstone	FM 3-0 Draft, June 2007 Capstone
Purpose of Doctrine	"FM 100-5 is the Army's keystone warfighting doctrine. It is a guide for Army commanders. It describes how to think about the conduct of campaigns, major operations, battles, engagements, and operations other than war. It applies to the Total Army, active and reserve components as well as Army civilians. Finally, FM 100-5 furnishes the authoritative foundation for subordinate doctrine, force design, materiel acquisition, professional education, and individual and unit training."[19]	"It facilitates communication among soldiers no matter where they serve, contributes to a shared professional culture, and serves as the basis for curricula in the Army education system. Army doctrine provides a common language and a common understanding of how Army forces conduct operations. It is rooted in time-tested principles but is forward-looking and adaptable to changing technologies, threats, and missions. Army doctrine is detailed enough to guide operations, yet flexible enough to allow commanders to exercise initiative when dealing with specific tactical and operational situations. To be useful, doctrine must be well known and commonly understood."[20]	"Doctrine links theory, history, experimentation, and practice. Its objective is to foster initiative and creative thinking. Doctrine encapsulates a larger body of knowledge and experience. It provides an authoritative statement about how military forces conduct operations and a common lexicon with which to describe them. Doctrine furnishes the intellectual tools with which to diagnose unexpected requirements. It also provides a menu of practical options based on experience from which self-aware and adaptive Army leaders can create their own solutions quickly and effectively."[21]	"Doctrine is a guide to action, not a set of fixed rules. It combines history, an understanding of the operational environment, and assumptions about future conditions to help leaders accomplish missions. Doctrine must be grounded in national values, consistent with human nature, and broad enough to provide a guide for unexpected situations. Doctrine applies to all operations, present and near-term future. It provides an authoritative guide for leaders and Soldiers but requires original applications that adapt it to circumstances. Effective doctrine fosters initiative and creative thinking. Doctrine establishes a common frame of reference including intellectual tools Army leaders use to solve military problems."[22]

In the 2005 edition of FM 1, *The Army*, writers framed a purpose for doctrine to "link theory, history, experimentation, and practice." The FM 1 writers incorporated the 1993 concept from FM 100-5 that doctrine serves a purpose to "foster initiative and creative thinking."[23] Along the same line of thought, writers of an early draft of the 2007 FM 3-0 frame a clear boundary between policy documents that establish rules, while doctrine serves to provide guidelines for thinking.[24] In 2006, FM 3-24 writers suggested that doctrine serves a purpose to incorporate lessons learned from previous operations in

order to "help prepare Army and Marine Corps leaders to conduct counterinsurgency operations."[25]

Table 3. Purpose of Doctrine (Continued)

Doctrine Development Process	FM 1.02, 2004 Keystone	FM 3.24, 2006 Keystone	Joint Pub 1.02, 2007 Joint Doctrine
Purpose of Doctrine	"This manual is a dual-Service US Army and US Marine Corps publication introducing new terms and definitions and updating existing definitions as reflected in the latest editions of Army field manuals and Marine Corps doctrinal, warfighting, and reference publications. It complies with DOD Military Standard 2525. When communicating instructions to subordinate units, commanders and staffs from company through corps should use this manual as a dictionary of operational terms and military graphics. This manual incorporates changes in joint terminology and definitions as reflected in JP 1-02 (as amended through June 2003) and provides a single standard for developing and depicting hand drawn and computer-generated military symbols for situation maps, overlays, and annotated aerial photographs for all types of military operations. The symbology chapters of this manual focus primarily on land military symbols applicable for the Army and Marine Corps."[26]	"Establishes doctrine (fundamental principles) for military operations in a counterinsurgency (COIN) environment. It is based on lessons learned from previous counter insurgencies and contemporary operations . . . purpose is to help prepare Army and Marine Corps leaders to conduct COIN."[27]	"Sets forth standard US military and associated terminology to encompass the joint activity of the Armed Forces of the United States in both US joint and allied joint operations, as well as to encompass the Department of Defense (DOD) as a whole. These military and associated terms, together with their definitions, constitute approved DOD terminology for general use by all components of the Department of Defense . . . to ensure standardization of military and associated terminology…This publication supplements standard English-language dictionaries with standard terminology for military and associated use . . . is promulgated for mandatory use by the Office of the Secretary of Defense, Military Departments, Joint Staff, combatant commands, Defense agencies, and any other DOD components. DOD terminology herein is to be used without alteration unless a distinctly different context or application is intended."[28]

Over time, doctrine writers show consistency in ascribing to doctrine a central purpose of providing common terms to facilitate effective communication as well as to provide state of the art knowledge that incorporates links between relevant theory, experiments, and lessons learned. Of perhaps equal importance, doctrine serves as a

tether to time-tested principles and values that enable leaders to know what to do when what needs to be accomplished is hidden in a shroud of uncertainty. The remainder of this section deals with senior leaders' perspectives on the purpose for Army doctrine.

Senior Leaders Perspective on Doctrine

According to Romjue,[29] the Cold War, the Korean War, and the War in Vietnam revealed serious shortfalls in the Army's doctrine for planning and conducting operations.[30] He noted that, "what was needed was a re-recognition of, and focus upon, the critical level of operational art."[31] The 1986 AirLand Battle concept of doctrine, published as FM 100-5, *Operations*, focused on the operational level as the approach for US commanders to fight and win a conventional war when the opponent had superior numbers. The purpose of doctrine was to leverage technology in distributing fires to increase battlefield depth. The primary tenet highlighted the need to shape how enemy forces maneuvered on the battlefield so that US and coalition forces engaged manageable targets over an extended time.

With the collapse of the Soviet Union, the US emerged as the world's single dominant nation. The new security environment brought the need for a new strategy, as well as doctrine, to guide changes in force structure, training, and strategy. As a result, the Army Chief of Staff, General Gordon Sullivan, developed the concept of doctrine as the "engine of change."

General Sullivan envisioned the FM 100-5 and AirLand Battle doctrine revision as an engine of change for all Army doctrine manuals. Principles, symbols, and terminology in FM 100-5 became the foundation for all Army doctrine. More importantly, the 1993 FM 100-5 linked the operational level of war with US strategic

concepts of war. Thus, the purpose of doctrine expanded to include the intellectual and conceptual framework Army leaders applied to develop, train, educate, and field forces to combatant commands.

Importantly, as a seminal manual, FM 100-5 concepts drove revisions in other services manuals as well as Army manuals. While the Navy and Air Force published operations manuals at the same time, none had the impact that FM 100-5 had for the Army and the military as a whole. Romjue describes doctrine as a harbinger of new intellectual concepts such as the Mobile Defense and AirLand Battle, which in turn created new thinking on force structure, operations, tactics, and technology.[32] Over time, doctrine manuals took increasing importance in translating physical battlefield realities into a usable form to guide decisions across the full range of Service Title X responsibilities to develop, train, educate, and equip military units. Doctrine concepts stimulated intellectual debate amongst the services and the Defense Department as a whole. Romjue notes that not only were emerging doctrine concepts theoretical, these new ideas reflected relationships between increasingly diverse factors.[33] US led coalition victories in the 1991 Gulf War, and the Army's experience in Operation Just Cause in Panama supported the proposition that described doctrine as an engine of change to transform battlefield realities into new force development concepts.

In the relatively stable cold war environment, time was an important but not determinative factor in doctrine meeting the purpose to be an engine of change. As realities of the post-cold war security environment became evident, both doctrine's purpose and the development process came into question. During the cold war, a linear battlefield with primarily conventional forces served as the organizing construct. As a

result, doctrine writers followed a deliberate approach to develop concepts that served to frame other force development activities.[34]

After the Soviet collapse, the longstanding doctrine development process for transforming battlefield realities into usable information no longer supported doctrine as the primary factor in force design and development. The post-cold war environment introduced new security realities with a non-linear battlefield as the organizing construct. One critical factor concerning doctrine dealt with a new approach to thinking about doctrine--futures planning. The impact was that when planning across multiple, alternative futures the resulting concepts became at once complex and often contradictory. Doctrine writers had to deal with more variables that were in constant flux.[35]

Doctrine writers grappled with describing the linkages between the strategic, operational and tactical levels of war across the entire spectrum of conflict from peacetime to low-intensity conflict on up to full-scale war. The challenge centered on developing doctrine for operations across the spectrum of conflict that ranged from peacetime engagement to conventional combat operations. Despite a major shift in the security environment, senior Army leaders 'believed the impact of new doctrine would be fundamental . . . it would be the motor of force design, materiel development, training, and leader development for the whole or "Total Army."'[36] Thus, Army leaders continued to emphasize doctrine updates to ensure operational concepts set the direction for all the DOTMLPF elements.[37]

Perspective on Doctrine for a New Chief of Staff of the Army in 1999

In 1999, the Army Chief of Staff, General Eric Shinseki, envisioned a scope of transformation that would precede doctrine. The outgrowth made changes in materiel coequal with doctrine as an engine of change. In the new model, materiel development and doctrine combined to drive transformation. The materiel side framed a "Future Force" organization that would be "responsive, deployable, agile, versatile, lethal, survivable, and sustainable"[38] As a result, doctrine no longer served as the initiating impetus for change. Rather, the model became a hybrid between doctrine and materiel. The combining of materiel and doctrine provided the vision that doctrine writers described as an update to replace FM 100-5, the FM 3-0, *Operations*, (June 2001).

As a result of change in the security environment, and scope of transformation, time became an increasingly important metric to gauge the process for developing doctrine that served to drive change in the DOTMLPF elements. In a non-linear, ever changing environment, developing and disseminating relevant doctrine became increasingly difficult. In addition to the time factor, the absence of a firm doctrine definition did little to support a timely and effective development process. The following section source outlines the range of working definitions that Army senior leaders and doctrine writers applied to the engine of change.

Army Doctrine: Development Process

The aim of this section is to provide an overview of the process for developing Army doctrine. Sources describe the development process as a hierarchy, which often begins with the development and distribution of capstone manuals, FM 1, *The Army*, and

FM 3-0, *Operations*. The capstone manuals link Army doctrine with joint doctrine and other National Strategy documents. In a hedging statement that highlights a dynamic environment, writers noted that the doctrine hierarchy "does not drive doctrine development priorities, nor does it establish priorities for resourcing, force management, or other decisions."[39] The doctrine development process works to translate new realities from the operational environment into theories and principles that leaders study to understand how to orchestrate military power in achieving national objectives. The critical quality control factor is to keep current a dynamic body of professional knowledge. The pacing mechanism is based in timely dissemination to practitioners.

The doctrine development process is defined in TRADOC Regulation 25-36 as "the process of researching, conceptualizing, analyzing, integrating, determining, documenting, writing, publishing, and distributing doctrinal products. This also includes articulating doctrine requirements."[40] The process is lengthy, highly detailed, and requires collaboration with major commands, schools, Army and service branches, as well as subject matter experts. A synopsis of the process is provided at Appendix A.

There are two tiers to doctrine. The first tier, Tier One, includes all the capstone and keystone Field Manuals (FMs) (see Appendix B, Army Doctrine Hierarchy). Tier Two doctrine includes all other manuals not designated as Tier One.[41] FM 1, *The Army*, and FM 3-0, *Operations*, are the only capstone manuals. Keystone doctrine includes those manuals promulgated by separate branches of the Army (for example, aviation, signal, infantry, and armor) that affect Army full spectrum operations.[42] The remaining field manuals in Tier Two are called supporting doctrine. There is no definition for this type of doctrine in TRADOC Regulation 25-36. This study focuses on the development

process of the capstone manuals because the measure of performance is the duration of time between the development of capstone and keystone manuals.

The Army Vision serves as the starting point for capstone doctrine manuals. The Army Chief of Staff, with the assistance of other senior Army leaders, forms the Army Vision from the *National Security Strategy*, *National Military Strategy*, *Defense Planning Guidance,* and other national and joint publications that describe future operational capabilities. The vision integrates joint and interagency capabilities requirements.

The Army Vision is defined as "a conceptual template for how the US Army will channel the vitality and innovation of its Soldiers and civilians, and leverage technological opportunities, to achieve new levels of effectiveness, as the land component member of the joint warfighting team."[43] The Chief of Staff of the Army (CSA) is the formal authority for promulgating the Army Vision. The CSA is also responsible for the next step in the process, developing the concept of operations for the Army. The concept of operations for the Army is called the Capstone Concept, and "there is only one Capstone Concept, which is valid at any time."[44] The CSA develops the Capstone Concept with the assistance of the Army's senior leadership, but the CSA retains formal authority for the Capstone Concept. All other manuals must develop operational concepts that are consistent with, and support, the Capstone Concept.[45] This last point contradicts the regulation's earlier statement that the doctrine hierarchy "does not drive doctrine development priorities, nor does it establish priorities for resourcing, force management, or other decisions."[46] Obviously, a manual that does not agree with the Capstone Concept must be revised to maintain its consistency with a new Capstone Concept.

The conceptual template frames the "ideas, thoughts, and general notions that describe the capabilities required for conducting military operations in the future. They prescribe where and when these operations will occur, and how the concept fits in with concepts for related operations. They may depict military operations that cannot be conducted with current resources. Concepts are futuristic, as opposed to doctrine, which prescribes how to use available resources to defeat the current and near-term threat."[47]

The Capstone Concept is abstract and requires refinement by "concept developers,"[48] who are responsible for evaluating the concept in relation to all the elements of the DOTMLPF (doctrine, organization, training, materiel, leadership, personnel and facilities) analysis process in order to determine the applicability of the concept as the new operational concept for the Army.

Once the new operational concept for the Army has been developed and tested for validity through real and experimental operations (e.g. training exercises and real-world missions), it is proposed as doctrine. The Army operational concept is included in Army doctrine as a revision or update to FM 1, The Army and/or FM 3-0, Operations. The regulation does not clearly state whether FM 1 or FM 3-0 or both manuals have the Capstone Concept. The current Army operational concept is contained in Army FM 1, The Army (2005).[49] The CSA usually designates the TRADOC Commander as the proponent for publishing a new version of FM 3-0. The process above is the basis or "capstone" for all doctrine development.

The formal doctrine development process is described at Appendix A. "The process has six steps: (1) Assessment; (2) Planning; (3) Development; (4) Production; (5) Publishing and Dissemination; and (6) Implementation, Evaluation, and Rescission."[50]

The assessment step involves the proponent authority analyzing future operational capabilities through the Army Capabilities Integration and Development system (CIDS)--the Army agency who leads the DOTMLPF analysis). The proponent authority also examines "lessons learned"[51] from past and current operations and training exercises, and researches existing doctrinal publications "for currency, usefulness, and relevancy, to identify doctrinal requirements."[52] The planning step involves the production of a Program Directive (PD). "It is the official document that establishes a doctrine development requirement, and authorizes the expenditure of resources, to develop the doctrinal publication needed, to meet the requirement."[53] The PD outlines an initial writing staff, the doctrine requirement, and acts as guidance for them. When the PD is approved, the process goes to the next step, development.

The development step involves the proponent authority's staff of writers drafting a specific manual. The proponent writing staff, which may include contractors, reserve component, and active duty personnel, follows the PD and refines it as the model for writing the manual. Time is a critical factor, and TRADOC Regulation 25-36 has a formal model for estimating time value in order to focus staffs on completion of the manual (see table 4).

Table 4. Doctrine Development Estimated Time Values

Doctrine development time requirements

Stage	Accelerated Development (in months)		Routine Development (in months)	
	Time for Stage	Time Elapsed	Time for Stage	Time Elapsed
Program Directive	1	1	2	2
Staffing of Program Directive	1	2	1	3
Author's Draft/Initial Draft	0	2	6	9
Staffing of Initial Draft	0	2	1.5	10.5
Final Draft	4	6	5	15.5
Staffing of Final Draft	1.5	7.5	1.5	17
DRAG Draft	0	7.5	2	19
Staffing of DRAG Draft	0	7.5	1	20
Conduct DRAG	0	7.5	0.5	20.5
Final Approved Draft	1.5	9	0.5	21
Prepare Camera Ready Copy (CRC)	1	10	2	23
Distribute (Final Quality Assurance, Authenticate, Publish)	2	12	2	25

Source: Headquarters, Department of Army Training and Doctrine Command, Training and Doctrine Command (TRADOC) Regulation 25-36, *The TRADOC Doctrinal Literature Program* (Fort Monroe, VA: Government Printing Office, 2004). 29.

Most manuals are templated for completion between 4 months to 24 months. The time factor depends on the length of the manual, the urgency of the revision, and when an initial draft is required to develop consensus.[54] All manuals are required to be distributed Army wide at least once for criticism and comments for improvement. The critical factor in the development step is gaining consensus from affected agencies, branches, and units. Each manual is different and so the required consensus is different for each manual. There is a formal process described for developing responses, questions, and issues from affected agencies and units as part of consensus and staffing. Staffing is done in writing to each agency affected as listed in the PD. The drafts are also staffed electronically through use of a website on Army Knowledge Online (AKO) portal and or BCKS. Once

the drafts (and several drafts are normally required) have gone through the development step and obtained approval from the proponent authority, the process moves to the next step, production.

In the production step, the draft is put into Camera Ready Copy, for print media format, and a Final Edited File copy for digital distribution in accordance with TRADOC Regulation 25-30, and Department of the Army Pamphlet 25-40.[55] In the publication and dissemination step, the manual is submitted for approval to publish and distribute to the Army after CADD and US Army Training Support Center have completed a final quality assurance check. Once the checks are complete, the manual is distributed through print and electronic media. The Army Publishing Directorate posts the manual on the AKO portal, and publishes the manual to the target audience in print form.

In the final step, implementation, evaluation, and rescission, the implementation part involves the application of the manual by units, schools, and agencies in training and other missions. Various commands and CALL (Center for Army Lessons Learned) provide feedback on the doctrine's relevance and recommend improvements.[56] Evaluation involves the proponent agency formally reviewing the effectiveness of the doctrine every 18 months "per Army Regulation 25-30, paragraph 1-23b(5)."[57] The manual is evaluated for effectiveness utilizing the following criteria for "effective doctrinal publications are accurate, acceptable, well researched, flexible, understandable, consistent, concise, and timely."[58] Finally, rescission involves the proponent authority determining the doctrine is no longer required, and requesting the halt to distribution, removal from electronic media, and further dissemination.

Army Doctrine: Summary

In summary, by definition and purpose doctrine represents the Army's knowledge base. FM 100-5, 1993 edition described Army doctrine as an "engine of change." Doctrine is the starting point and direction for changing the elements of DOTMLPF. Importantly, doctrine captures the "fundamental principles" that guide planning and conducting military operations worldwide. It provides the common terms and symbols for the Army as well as a body of best practices in the form of TTPs. Finally, doctrine provides the primary knowledge and foundation that supports curricula for Army education. In short, doctrine is the Army's knowledge.

Over the decades, the range of definitions and purpose statements proved responsive to requirements in the operational environment as well as to shifts in senior Army leader priorities. When facing a peer competitor, like the Soviet Union, Army leaders used doctrine to explain battlefield realties as the primary means to shape both force structure and operations. As the security environment became less stable due to asymmetric opponents, and operations that dealt with a wide range of military roles, doctrine became less the driver of change and more a reflection of change. In the former case, the development process focused more on clarity and accuracy. In the current case, ambiguity is the dominant factor in the operational environment so doctrine is now of necessity more a time driven process. As the nature of doctrine changed, so the purpose of doctrine has changed. While the purpose and development have shifted to accommodate new operational environment realities, the development process has an uneven record in keeping fresh and relevant the body of professional knowledge that field leaders require to employ military forces toward national objectives. The following

section deals with knowledge management tenets as a potentially new organizing construct for the Army doctrine development process.

Knowledge Management as a New Organizing Principle

The fourth section of the literature review introduces knowledge management concepts and principles as an organizing construct for Army doctrine development. Sources deal with knowledge management theories and principles that relate to the Army doctrine development process. There are many theories of knowledge management but this thesis will examine three representative theories in order to establish common principles of knowledge management.

Knowledge Management: Background

Many knowledge management practitioners trace the start of knowledge management theory with a definition of knowledge from distinguished physical chemist and philosopher Michael Polanyi. He developed a "post-critical philosophy of personal knowledge"[59] due to a deep concern with the freedom of thought. The concern with freedom of thought stemmed from Dr. Polanyi's repressive experiences of Nazi ideology in Germany, and then later Communism from the Soviet Union. Polanyi was "intensely anti-rationalistic because he believed that secular rationalism had undermined the moral values, which are fundamental to Western Civilization."[60]

Polanyi was among the first modern philosophers to distinguish between two kinds of knowledge, tacit and explicit. "Explicit knowledge consists of that knowledge which can be expressed symbolically in words, numbers, diagrams, and other symbols,

and which can be taught to other people through the verbal and mathematical articulation of these symbols."[61] Polanyi explains that:

> Personal or tacit knowledge includes all nonverbal or preverbal knowledge which precedes and underlies explicit knowledge . . . [it] is always involved in learning: learning to comprehend and to understand the meaning of language; learning to interpret and to understand all explicit knowledge; and learning all complex skills, such as swimming, driving an automobile, reading and playing a musical instrument.[62]

Polanyi's distinction between tacit and explicit knowledge led other researchers to investigate the relationship between tacit and explicit knowledge, the expanded interest brought a greater appreciation to the importance of knowledge in business, economics, sociology, psychology, philosophy, and education.

On the other hand, Laurence Prusak, another early knowledge management practitioner, explains that the ancient Greek philosopher Aristotle was the first to distinguish between tacit and explicit knowledge.

> Almost from the beginning, knowledge management has explored the differences between tacit and explicit knowledge, between "know how" and "know what." This essential distinction, first made by Aristotle, seems to have been forgotten during the years after World War II, when an extraordinary amount of systems development occurred and much routine work was computerized.[63]

Prusak contends that knowledge management comes from several sources. These sources included intellectual developments in the fields of economics, sociology, philosophy, and psychology. KM also grew out of certain business practices, including "information management, the [total] quality movement, and the human factors/human capital movement."[64] Prusak defines information management as:

> A body of thought and cases that focus on how information itself is managed, independent of the technologies that house and manipulate it. It deals with information issues in terms of valuation, operational techniques, governance, and incentive schemes. Information, in this context generally means documents, data, and structured messages.[65]

Prusak argued that KM "shares information management's user perspective--a focus on value as a function of user satisfaction rather than the efficiency of the technology that houses and delivers that information."[66] This concept was important for doctrine development as well because increasingly doctrine is demanded in information technology (IT) formats such as digital files and internet websites in order to satisfy the "user," with doctrinal knowledge. Prusak also states that KM shared information management's concern with the "quality of the content and how much it benefits the recipient and the organization."[67]

Another important element KM shares with information management is that "not all information is created equal, that different types of information have different values and need to be handled differently. This insight--which is more true of knowledge--remains at the heart of knowledge management today."[68] It is important because KM is concerned with the techniques and technologies that "are appropriate for sharing different kinds of knowledge, and in our focus on knowledge use, not just knowledge availability."[69]

Prusak explains that KM derived its focus in "internal customers, overt processes, and shared, transparent goals"[70] from the total "quality movement" business practice. He adds that the total quality movement developed techniques for improving manufacturing processes but that KM adopted the three goals from the total quality movement and applies them in a much broader scope. "Knowledge work involves making knowledge visible and therefore developing knowledge processes, process owners, and governance structures in ways that owe a significant debt to the techniques of analysis and improvement developed by the quality movement."[71]

The last business practice that KM derived its principles from is the human capital approach. “The essential message from investigators of human capital is the financial advantage to states and firms of investing in individuals, mainly through education and training.”[72] The result of this investment is a “higher return rate (in the form of higher worker productivity, skills development, innovative capacity, and ease of labor mobility) than many or all other options.”[73] KM shared this concern with making the value of human capital “clear to organizational leaders while developing tools and techniques for investing and reaping benefits from it.”[74] However, KM is more concerned with “group knowledge and processes of social capital that undergird group knowledge”[75] as opposed to the individual.

Prusak explains that KM developed from three demands “globalization, ubiquitous computing, and the knowledge-centric view of the firm,”[76] in response to social and economic trends. Globalization, viewed mainly as the growth in the complexity and volume of global trade, was due primarily to the improvements and availability of information technology. The speed, distances, and volume of trade and trading partners combined with “the decline of centralized economies”[77] led to the demand within businesses for greater knowledge of expertise, clients, and innovation.

The consequence of “ubiquitous computing” was equally dramatic increases in information. In order to manage the increase in information, “knowledge components such as judgment, design, leadership, better decisions, persuasiveness, wit, innovation, aesthetics and humor become more valuable than ever before.”[78] Thus, the value of these “more knowledge-intensive skills”[79] has increased to all businesses and KM developed in response.

Lastly, Prusak argues that KM grew out of "knowledge-centric view of the firm."[80] Businesses in conjunction with "economists, strategy academics, and commentators agree that a firm can best be seen as a coordinated collection of capabilities, somewhat bound by its own history, and limited in effectiveness by its current cognitive and social skills."[81] Thus, the main component or unit of analysis for these capabilities is "knowledge, especially the knowledge that is mostly tacit and specific to the firm."[82] Correspondingly, firms began to focus on satisfying the demand for knowledge and KM theories developed through business conferences, management programs and courses. Laurence Prusak and some colleagues organized just such a conference in Boston in 1993 and its topic was "devoted to knowledge management."[83]

Three Representative Theories of Knowledge Management

Two Japanese researchers of industry, Nonaka and Takeuchi, developed one of the first theories of knowledge management. They conducted a study of various Japanese business firms, using Polanyi's distinction of tacit and explicit knowledge, in order to show how business innovation occurs through managing the flow of tacit and explicit knowledge within an organization. In short, by reorganizing proprietary explicit and tacit knowledge flows a company will create knowledge and innovation. Their theory explains four types of knowledge exchange or transfer. Importantly, their study suggests that the most effective type of knowledge exchange is from tacit to explicit knowledge. Tacit knowledge is difficult to express, and often involves special skills or expertise (such as a doctor has). In order for an individual to explain tacit knowledge to a co-worker who does not have the requisite skill, metaphors and analogies, and models are written or drawn in order to explain the tacit knowledge, as well as personal training and coaching.

The business records the metaphors, analogies, and models with explanations in formal operating procedure documents, and then distributes these documents for all employees in the company to use. In addition, the managers identified and reorganized different working groups to apply their unique tacit knowledge to solve common strategic level business problems for the organization. The process and procedures above resulted in innovation and new knowledge for the company.[84]

The second theory of knowledge management comes from Etienne Wenger. Wenger applied Polanyi's tacit and explicit knowledge concepts as part of research into the social nature of learning. He observed that people in organizations developed a community of practice to solve problems, socialize, and share interests both within and outside an organization. Wenger defines communities of practice as "groups of people who share a passion for something that they know how to do, and who interact regularly in order to learn how to do it better."[85] These communities arise spontaneously, and direct themselves in response to shared problems and common interests. Over time, these communities develop a body of knowledge and expertise from solving problems together. The community's body of knowledge is defined as the community's practice. It includes ideas, procedures, documents, and databases that act as both a standard for the community and a repository for research in solving community problems. Sharing improves the quality and quantity of knowledge.

Wenger emphasizes that by mapping or analyzing these communities of practice an organization can identify new sources of expertise, and then distribute these lessons in the form of best practices throughout the organization. Experts should be encouraged and supported by management to solve strategic level organizational problems. Managers

must be careful that control measures not degrade internal relationships or integrity, spontaneity and trust. The communities of practice also provide personal improvements in knowledge, new social relationships, and professional development for each of its members. The personal and professional development provides the impetus and incentive for sustaining a community of practice. The result is a learning organization centered on developing its knowledge through a network of communities of practice in order to solve strategic problems of the organization.[86]

Tom Davenport and Laurence Prusak present a third theory of knowledge management that deals with "working knowledge."[87] The primary thesis is that knowledge is a vital strategic resource (social or human capital) for a business. By developing a strategy for knowledge management to solve existing business problems, a firm will transform into a knowledge-centric or knowledge-based organization creating new knowledge, and new value, while also improving the effectiveness and efficiency of the business. The primary means to accomplish this transformation to a knowledge enterprise is to understand the difference between data, information, and knowledge, and identify and define what constitutes knowledge for an organization, and then map knowledge flow throughout the enterprise.

Next, the business must reorganize its processes, organization, and culture (and usually its information technology) around its knowledge in order to solve existing business problems or achieve business goals. The difficulty is in defining the firm's knowledge, and maintaining trust of employees, while dramatically transforming the organization around knowledge. Davenport and Prusak provide numerous case studies of businesses explaining the successes and failures of knowledge management projects or

systems in many different businesses. Out of these case studies, they provide eight principles for effective knowledge management. These principles will be presented in the next section.

The importance of the theory is its emphasis on the distinctions between data, information, and knowledge (which the Army understands as the knowledge hierarchy in FM 6.0, *Mission Command*,[88] and the importance of correctly identifying (through knowledge mapping--a system for examining the flow of knowledge within and without a firm) what constitutes knowledge for an organization. "Working knowledge" theory contends that neither information technology nor technology in general represent the primary focus for knowledge management. Working knowledge identifies knowledge mapping both within and outside an organization as a critical element of knowledge management. Working knowledge also explains that collaboration (like communities of practice), and a culture that fosters knowledge creation in order to achieve existing business goals are essential elements for the success of any knowledge project or system.

Principles of Knowledge Management

The aim of this section is to present the principles of knowledge management from Wenger's theory of communities of practice, and Davenport and Prusak's theory of working knowledge. Both of these theories have well developed principles of knowledge management.[89] Additionally, this section will compile the essential principles from these theories into a single set of knowledge management principles that will serve as an analysis framework for chapter 4.

Wenger derives theory knowledge management principles from his communities of practice. The first principle is that "practitioners, the people who use knowledge in

their activities, are in the best position to manage this knowledge."[90] He explains that this is why communities of practice (also called communities) are critical to KM because they are dedicated to delivering explicit knowledge to practitioners. The second principle of knowledge management is that "communities of practice are the cornerstone of knowledge management. Communities can be defined by disciplines, by problems, or by situations."[91]

The third principle for communities is 'the role of professional "managers" is not to manage knowledge directly, but to enable practitioners to do so.'[92] As a result, "communities of practice manage their knowledge,"[93] and not traditional business leaders, since knowledge is a shared resource and responsibility. In essence, the community determines its own leaders, administrators, and facilitators, in consultation with business leaders. Consequently, the communities must "dialogue with executives in the organization, other communities of practice, and experts outside the organization"[94] in order to ensure the community is aligned with the organization's strategic goals. He explains that the critical role of managers is to provide "a bridge between the hierarchical structure of the formal organization and the horizontal structure of communities."[95] Managers must negotiate between communities of practice, helping them to communicate and share their knowledge amongst a network of communities, and back into the organization.

Wenger states that communities develop "practice" which is defined as "the body of knowledge, methods, tools, stories, cases, documents, which members share and develop together."[96] The communities determine what practices are distributed to the organization (and other external communities) as lessons learned or best practices. The

Army's CALL has been cited by community practitioners as one of the best examples of an effective community of practice. Communities must incorporate a part of the business's existing strategic plan and objectives in order to serve the entire organization. Managers must assist communities to select and refine strategic business goals and objectives, appropriate for their community. The leadership and the communities must understand the paradox that "no community can fully manage the learning of another, but no community can fully manage its own learning."[97] This means that managing knowledge is a shared responsibility and leadership must provide the environment to enable communities to develop practitioners as the managers of knowledge. Leadership must understand that their business strategy gradually transforms into a knowledge strategy with a set of knowledge "domains." A domain is an area "of knowledge that brings the community together, gives it identity, and defines the key issues that members need to address."[98] The difficulty is in identifying the knowledge domains from the current business strategy and then identifying expertise amongst practitioners to lead a community. Again, the community selects its own leadership, who act as coordinators, facilitators, and subject matter experts. Leadership must provide a support structure for communities with resources, and negotiate between communities to determine what goes back to the organization in the form of best practices. Finally, leadership must "translate strategic imperatives into a knowledge-centric vision of the organization,"[99] so that communities can better contribute their best practices and expertise to the organization.

The second theory of KM, with a distinct set of principles, is that of Davenport and Prusak's, "working knowledge."[100] They provide eight principles for KM. The first principle explains that knowledge resides within people. Thus, communities of people

(like communities of practice) must be identified (through a knowledge map), and connected to each other through both personal contact and technology. The second principle highlights the importance of identifying appropriate expertise for knowledge communities and establishing personal relationships amongst its practitioners in order to build trust and integrity in the community. The third principle explains that technology (like intranet, internet, groupware, and data repositories) constitutes a means for better collaboration and communication amongst communities and practitioners. However, training and personal contact are essential in developing the communities.

The fourth and fifth principles highlight the role of managers in supporting, resourcing, and rewarding KM sharing in order to encourage the development of communities of practice. The sixth KM principle explains that KM works best by implementing the KM strategy gradually through isolated test cases, a test program. The test program minimizes the impact on overall operations and gives greater flexibility in execution of the KM strategy. The seventh principle explains the importance of measuring quantity and quality of the KM system in some way meaningful to the organization. Every organization must determine measures of performance and measures of effectiveness for its knowledge management strategy. This principle is important because knowledge is very difficult to measure effectively. The final principle deals with the fluid nature of knowledge. Since what constitutes knowledge is ever changing and fluid, managers must establish a knowledge management strategy that is flexible and responsive to the changing definition and role of knowledge. KM strategies and plans must be flexible and adaptable to allow for new communities, changing objectives, and

eliminating redundant systems and communities. In short, KM is a constant labor to capture the variations in knowledge.

What is common to these two theories is the development of a network of communities of practice who focus on solving strategic level problems for their organization. The purpose of the communities is to share knowledge and expertise, and deliver a body of best practices to the organization, and for the community. The best practices, and new communities, foster initiative, focus the community on developing new knowledge, and result in innovation, new capabilities, and value for the firm. Managers or leaders have the role of negotiating between communities in the organization, providing the resources for them (which include time and space for personal interaction and IT). Managers are also responsible for rewarding and promoting expertise, and translating the current business strategy into a flexible knowledge strategy. The end state is to transform the organization into a learning organization whose most important asset is knowledge.

The Army and Knowledge Management Strategy

In a recent study, Williams found that the Army Knowledge Management Strategy[101] is a flawed strategy for IT acquisition.[102] His review of Army Regulation 25-1 concludes:

> AR 25-1 (dated 15 July 2005) is an outdated and ineffective regulation for KM and IT, as well as IT acquisition requirements development. This document needs a complete retooling that will make it a relevant and reliable source of true KM guidance. There are a number of good things happening in Army KM, but none of them are found in AR 25-1, only some obscure, ambiguous and obsolete terms, like e-Army and networthiness.[103]

Williams finds that the Army's premier knowledge management programs, like the BCKS and CALL, suffer from a lack of collaboration and integration through a single network. He also reported that Army KM sites have poor collaboration and network connections with existing commercial enterprises like Amazon.com™, and Google.com™. He explains that Department of Defense (DoD) studies and reports have concluded the same. He contends that because Army acquisition and Army knowledge management systems lack integration in a single knowledge management strategy, the result is a systemic failure to acquire and track IT resources. Williams' recommended solution to the problem is better networking of existing systems, organizations, and personnel, with accountability through the DOTMLPF analysis process, and unifying them with a single knowledge management and IT acquisition strategy. He explains that most KM systems have created new bureaus, new doctrine (as in a KM doctrine manual) and new organizations that are redundant, and ineffective in delivering knowledge to the user. He states that Army Knowledge Management must eliminate or merge existing sites and personnel in order to eliminate these redundant bureaucratic organizations, systems, save resources, and make them effective for the user.

In addition, Williams and Laurence Prusak both argue that there is no single solution for KM. Williams explains, "KM is a discipline--a management of the organization with a particular emphasis of (IT) knowledge. This axiom holds true in the Army and DOD as it does in the commercial world. In this light, there is no knowing what the specific solution should look like."[104] Prusak argues similarly that the object of KM is to become "so deeply embedded in practices and organizational routines that they

become more or less invisible."[105] The point is that leaders must understand the concepts and principles of KM and apply them to their organizations.

Summary of Literature

In summary, doctrine is defined as a body of knowledge that practitioners in a professional field develop over time. Doctrine represents foundational knowledge, time-tested principles, as well as emerging best practices (or TTPs) that guide practice from entry level to the most experienced members of a specified profession. Over time, military doctrine writers repeat the importance that doctrine is more a guide than a prescription or checklist of activities. Thus, doctrine is a body of knowledge that informs practice. In keeping with KM principles, doctrine is dynamic in nature. Doctrine contains a set of theories and principles that leaders study to understand how to orchestrate military power in achieving national objectives. The unavoidable conclusion becomes that as a dynamic body of professional knowledge, doctrine has value in direct relationship to timely dissemination to practitioners.

The Army has adapted the purpose of doctrine to meet an asymmetric threat, and a broader range of conflict and military roles, which combined create an unstable security environment. Consequently, doctrine became less the driver of change and more a reflection of change. As the nature of doctrine changed, so the purpose of doctrine has changed. While the purpose and definition have shifted to accommodate new operational environment realities, the development process has an uneven record in keeping consistent and relevant the body of professional knowledge that field leaders require to employ military forces toward national objectives. The doctrine development process has remained largely static in the face of all of this change. Despite incorporating information

technology to speed up the distribution process, the doctrine development process remains largely the same. According to the Director of the Combined Arms Doctrine Directorate, new manuals take about two years to produce and disseminate. Large revisions take about the same time.

The KM theory offers principles that directly address the current problem in the doctrine development process. The principles express the importance of an organization developing a network of communities of practice, who assist the organization in solving strategic problems. The communities create a dynamic and adaptive body of best practices for themselves and the organization. The communities' voluntary and complex structure is responsive to the dynamic demands of the COE, and reflects the fluid nature of knowledge. The network creates a learning organization that develops new knowledge, capabilities and expertise over time. KM identifies the value of knowledge as a function of user satisfaction, and operates on the premise that "not all knowledge is created equal."[106] KM seeks to make knowledge visible by developing "knowledge processes, process owners and governance structures."[107] KM focuses on "group knowledge and processes of social capital that undergird group knowledge" [108] rather than the individual. KM also identifies and develops "knowledge intensive skills"[109] for an organization like "judgment, leadership, better decisions, persuasiveness, wit, innovation, aesthetics and humor."[110] Finally, KM identifies tacit knowledge, specific to an organization, as the most critical measure of value.[111] In the next chapter, the principles of effective doctrine development and the principles of KM are developed, formed, and arranged in an analysis framework to explore whether KM principles have potential to keep doctrine current with the times.

[1]Stephen J. Cimbala, "Joint Doctrine--Engine of Change?," *Joint Force Quarterly* (Winter 2002), http://findarticles.com/p/articles/mi_m0KNN/is_33/ai_n6082830 (accessed 27 July 2007).

[2]*Merriam-Webster On-line Dictionary*, Definition of Doctrine.

[3]Headquarters, Department of the Army, FM 100-5, Glossary-3.

[4]Headquarters, Department of the Army, FM 3-0, 1-14.

[5]Headquarters, Department of the Army, Field Manual (FM) 100-5, *Operations* (Washington, DC: Government Printing Office, 1993), Glossary-3.

[6]Headquarters, Department of the Army, Field Manual (FM) 3-0, *Operations* (Washington, DC: Government Printing Office, 2001), 1-14.

[7]Headquarters, Department of the Army, Field Manual (FM) 1, *The Army* (Washington, DC: Government Printing Office, 2005), 1-20.

[8]Headquarters, Department of the Army, Draft Field Manual 3.0, *Operations* (July 2007), E-2. *Note, this draft is not approved for citation and publication. The current edition of FM 3.0, June 2001 remains the approved Army Doctrine.

[9]Headquarters, Department of the Army, Field Manual (FM) 1-02, *Operational Terms and Graphics* (Washington, DC: Government Printing Office, 2004), 1-65.

[10]Headquarters, Department of the Army, Field Manual (FM) 3-24, *Counterinsurgency* (Washington, DC: Government Printing Office, 2006), vii.

[11]Chairman, Joint Chiefs of Staff, Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: Government Printing Office, April 2001, as amended through June 2007), 166.

[12]Headquarters, Department of Army Training and Doctrine Command, TRADOC Regulation 25-36, 63.

[13]Ibid., 64.

[14]Ibid.

[15]Ibid.

[16]Headquarters, Department of the Army, FM 100-5, iv.

[17]Headquarters, Department of the Army, FM 3-0, vii.

[18]Chairman, Joint Chiefs of Staff, Joint Publication 1-02, i.

[19]Ibid.

[20]Ibid.

[21]Ibid.

[22]Headquarters, Department of the Army, Draft FM 3.0, E-1.

[23]Headquarters, Department of the Army, FM 1, 3-4.

[24]Headquarters, Department of the Army, Draft FM 3.0, E-1.

[25]Headquarters, Department of the Army, FM 3-24, vii-ix.

[26]Headquarters, Department of the Army, FM 1-02, vi.

[27]Headquarters, Department of the Army, FM 3-24, vii-ix.

[28]Chairman, Joint Chiefs of Staff, Joint Publication 1-02, i.

[29]John L. Romjue, *American Army Doctrine for the Post-Cold War* (Fort Monroe, VA: Government Printing Office, 1996), 6.

[30]Ibid., 7-9.

[31]Ibid., 7.

[32]Ibid., 8-9.

[33]Ibid., 132-134.

[34]Ibid.

[35]Ibid., 27.

[36]Ibid., 36.

[37]Ibid.

[38]Anne Chapman, Benjamin King, and Carol Lilly, *Transforming the Army, TRADOC's First Thirty Years, 1973-2003* (Fort Monroe, VA: Government Printing Office, 2003), 27.

[39]Headquarters, Department of Army Training and Doctrine Command, TRADOC Regulation 25-36, 20.

[40]Ibid.

[41]Ibid., 20-21.

[42]Ibid.

[43]Ibid., 64.

[44]Ibid.

[45]Ibid., 67.

[46]Ibid., 20.

[47]Ibid., 64.

[48]Ibid.

[49]Headquarters, Department of the Army, FM 1, 3-4 to 3-12.

[50]Headquarters, Department of Army Training and Doctrine Command, TRADOC Regulation 25-36, 21.

[51]Ibid., 22.

[52]Ibid.

[53]Ibid., 24.

[54]Ibid.

[55]Ibid., 39.

[56]Ibid., 40.

[57]Ibid.

[58]Ibid., 19.

[59]Lewis E. Hill, "Towards a Personal Knowledge of Economic History: Reflections on Our Intellectual Heritage from the Polanyi Brothers," *The American Journal of Economic and Sociology* (January 1994): 2, http://findarticles.com/p/articles/mi_m0254/is_n1_v53/ai_15163022 (accessed 30 September 2007).

[60]Ibid.

[61]Ibid.

[62]Ibid.

[63]Laurence Prusak, “Where Did Knowledge Management Come From?,” *IBM Systems Journal* 40, no. 4 (2001), http://findarticles.com/p/articles/mi_m0ISJ/is_4_40/ai_82373867/ (accessed 30 September 2007).

[64]Ibid., 4.

[65]Ibid.

[66]Ibid.

[67]Ibid.

[68]Ibid.

[69]Ibid.

[70]Ibid.

[71]Ibid.

[72]Ibid.

[73]Ibid.

[74]Ibid.

[75]Ibid.

[76]Ibid., 1.

[77]Ibid.

[78]Ibid.

[79]Ibid.

[80]Ibid.

[81]Ibid.

[82]Ibid., 2.

[83]Ibid.

[84]Ikujiro Nonaka and Hirotaka Takeuchi, *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation* (New York: Oxford University Press, 1995).

[85]Etienne Wenger, "Knowledge Management as a Doughnut: Shaping Your Knowledge Strategy Through Communities of Practice," *Ivey Business Journal* (January/February 2004): 2, http://www.iveybusinessjournal.com/view_article.asp?intArticle_ID=465 (accessed 15 September 2007).

[86]Etienne Wenger, Richard McDermott, and William M. Snyder, *Cultivating Communities of Practice: A Guide to Managing Knowledge* (Boston, MA: Harvard Business School Press, 2002).

[87]Tom Davenport and Laurence Prusak, *Working Knowledge: How Organizations Manage What They Know* (Boston, MA: Harvard Business School Press, 2000).

[88]Headquarters, Department of the Army, Field Manual (FM) 6-0, *Mission Command: Command and Control of Army Forces* (Washington, DC: Government Printing Office, 2003), B-0 to B-1.

[89]These principles of knowledge management theories come from Etienne Wenger in *Cultivating Communities of Practice* (see reference number 36 and 37); and Tom Davenport and Laurence Prusak, *Working Knowledge: How Organizations Manage What They Know* (Harvard Business School Press, 2000), 24. (see reference numbers 39 and 52).

[90]Wenger, 2.

[91]Ibid.

[92]Ibid.

[93]Ibid.

[94]Ibid.

[95]Ibid., 6.

[96]Ibid., 3.

[97]Ibid.

[98]Ibid.

[99]Ibid., 7.

[100]Davenport and Prusak.

[101]Headquarters, Department of the Army, Army Regulation 25-1.

[102]Daniel S. Williams, "Using Innovative Knowledge Management Tools for Information Technology Development, Acquisition, and Integration in the United States Army" (Masters Thesis, Command and General Staff College, Fort Leavenworth, KS, 2007), 113-136.

[103]Ibid., 41.

[104]Ibid., 41-42.

[105]Prusak, 5.

[106]Ibid., 4.

[107]Ibid.

[108]Ibid.

[109]Ibid.

[110]Ibid., 1.

[111]Ibid., 2.

CHAPTER 3

METHODOLOGY

The purpose of the research was to answer the primary research question: Is knowledge management an appropriate strategy for Army doctrine development to keep pace with the rapid changes in the COE and force structure. This chapter aims to describe the research methodology. The chapter has four sections. The first section explains the research method. The second section explains the research procedures. The third section explains the analysis, which includes a comparison of KM and doctrine development. The final section is a summary of chapter 3.

Research Method

The case study method is useful as an exploratory tool, with a complex object.[1] The case study method was selected as the research method because it provides flexibility for including wide amounts of data and research on a contemporary situation with a complex object.[2] The single case study of FM 7-1, *Battle Focused Training* (also known as Virtual FM 7-1, VFM 7-1) was analyzed from two views, that of doctrine development and KM. Bias was a small factor in that one of the authors of FM 7-0, *Training the Force* was asked to become a committee member for this thesis after he left the writing team. However, this factor was mitigated by the fact that the committee members did not control the content, and provided only grammar, syntax, and factual critique. Additionally, the case study method was selected because VFM 7-1 is an open-ended study of a single case. The manual has not been published in its new web-based format, and is a complex object. A comparison between the doctrine development process and the

application of knowledge management to VFM 7-1's development is the object of the study in order to determine which process is more effective in solving the research problem. The technology VFM 7-1 uses is proven and in use by the Army now. The only novelty is the application of knowledge management concepts, tools, and principles to the doctrine development process. VFM 7-1 is a work in progress, and represents the only example of applying knowledge management to the doctrine development process. Thus, the case study method is an ideal approach for a comprehensive analysis and comparison of knowledge management and the doctrine development process.

Research Procedure

The primary data and information research included a series of interviews with the writing teams of FM 7-0 and VFM 7-1, and Mr. Clint Ancker, Director of the CADD. It also included a draft version of FM 7-0. Other materials gathered included various briefings to the FM 7-0 and 7-1 decision-making team, concept briefings, and reference material. Reference material included the previous editions of FM 7-0, and FM 7-1. Reference material also included draft "issue" letters for VFM 7-1. Issue letters are memorandums for the proponent authority, which were used by the writing team as a means to introduce the concepts and problems of developing a web-based or Virtual FM 7-1 as opposed to a traditional manual. Issue letters also helped in the staffing part (step 3, development) of the doctrine development process as explained in chapter 2. The issue letters kept the proponent authority, the Combined Arms Command for Training, (CAC-T) and collaborative units and commanders aware of the current problems and status of VFM 7-1, as well as asking for their feedback. VFM 7-1 represents a new concept of doctrine development utilizing knowledge management tools and concepts. It proposes a

"virtual" FM in a website presentation, which offers collaboration tools for the writers and users of the manual.

Information included a literature review, interviews, documentation, and observation. Interviews were conducted in three sessions. The first was on 16 April 2007, the second on 18 May 2007, the third on 24 August 2007. The first interview included questions on the purpose of FM 7-1, *Battle Focused Training,* and FM 7-0, *Training the Force,* the need for a revision and the concept of the new publication format as a website. Reference information gathered from this interview included the original FM 7-1, full concept brief of 9 April 2007, The Digital Training Management System Overview Briefing, and a draft of the revised FM 7-0, *Training the Force*. At the second interview, the questions focused on the composition of the writing team, the reasons for using a website format as opposed to the old digital and hard copy publication format, and the advantages of collaboration with the field and ability to leverage existing knowledge sites on BCKS for collaboration and feedback. Reference information obtained from the second interview was an issue paper on FM 7-0, *Training the Force*, in order to understand the training problems for the Army's current operational concept (in FM 3-0, *Operations*) of full spectrum operations.

The primary issue identified was defining and setting a training standard for "full spectrum readiness," in order to certify or validate that a unit is trained and ready to conduct full spectrum operations in real-world missions. Also obtained was an update briefing on FM 7-0 and FM 7-1 for Training and Doctrine Command Conference IV delivered on 10 April 2007. The third interview included questions for different writers of FM 7-1 and the director for the writing team. Questions covered the timeline for

completion, the background or history of the writing team and its work, and current issues. I also asked about issues with collaboration and reception from the field, especially from Army schools and major commands. Reference material gathered included the most current draft of FM 7-0 and two issue papers for VFM 7-1. I also obtained a demonstration of the VFM 7-1 website.

Interviews with the current CADD Director, Mr. Clint Ancker were done in order to validate the original research question from chapter 1, and to understand the impact and scope of this problem for all Army doctrine. There were three interviews conducted and all centered on establishing the definition, and purpose of doctrine and the problems with the current doctrine development process. Finally, the interviews included questions regarding recommended changes to the doctrine development process.

Analysis

The analysis plan employed two sets of criteria in an analysis framework. The first set was the criteria for effective doctrine from TRADOC Regulation 25-36. The regulation and the criteria were introduced in chapter 2. The regulation governs the composition of Army doctrine. Since VFM 7-1 is Army doctrine these criteria must, by regulation, be applied to determine the doctrine's effectiveness. The criteria for "effective doctrinal publications are accurate, acceptable, well researched, flexible, understandable, consistent, concise, and timely."[3] Table 5 displays the criteria for better understanding.

Table 5. Doctrine Measures of Effectiveness

Doctrine Measures of Effectiveness Criteria	
Accurate	
Acceptable	
Well-researched	
Flexible	
Understandable	
Consistent	
Concise	
Timely	

Next, a second set of criteria, the principles from Knowledge Management, were applied to determine the effectiveness of Knowledge Management. These criteria are a compendium of the principles of KM from the theories of Davenport and Prusak and Wenger from chapter 2 (see table 6). The principles were modified with Army

terminology and functions. Adapting these principles for the Army is a valid application of knowledge management principles according to both theories[4]. The findings from the analysis will also be presented. In the next step of the analysis, the findings from both sets of criteria were compared. The purpose of comparing the findings was to explain the relationship between knowledge management and the doctrine development process.

Table 6. Knowledge Management Criteria

Knowledge Management Criteria	
Leadership Support	
Defines knowledge domain	
Promotes Communities of Practice (per Wenger's principles for communities)	
Disseminates Best Practices	
Integrates Knowledge and Strategy	

Finally, based on the relationship above, the findings addressed the research question. The final portion of the study provides recommendations and discussion of any issues which remain for further research, and for improving the study.

Summary

The Case Study method was selected because it provided the means to collect and analyze multiple sources of large amounts of data. Additionally, the Case Study method allows examination of a complex real-life object. The analysis framework is based on criteria for effective doctrine as well as a second set of criteria from knowledge management theory. The findings of the analysis were compared in order to determine the relationship between knowledge management and the doctrine development process, and address the primary research question. The next chapter will provide results of analysis of the case and findings to answer the research question.

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[1]Ibid.

[2]Susan K. Soy, "The Case Study as a Research Method," Unpublished Paper, University of Texas at Austin, 1997, http://www.gslis.utexas.edu/~ssoy/usesusers/1391d1b.htm (accessed 8 September 2007).

[3]Headquarters, Department of Army Training and Doctrine Command, TRADOC Regulation 25-36, 19, par. 3-6.

[4] Both Wenger in *Cultivating Communities of Practice*, and Davenport and Prusak, in *Working Knowledge, How Organizations Manage What They Know*, explain that knowledge management involves managing the tacit and explicit knowledge relevant to an organization. Also, a principle, by its nature, inherently involves applying and adapting it for use in specific circumstances.

CHAPTER 4

ANALYSIS

Introduction

The purpose of this study was to answer the primary research question: Is knowledge management an appropriate strategy for Army doctrine development to keep pace with the rapid changes in the COE and force structure. The aim of this chapter is to analyze the doctrine development process and knowledge management of the web-based format of Virtual FM 7-1 (the draft revision of FM 7-1, called VFM 7-1). The chapter has four sections. The first section defines and applies the criteria for effective doctrine development, and gives the findings from the case study. The second section defines and applies the criteria for knowledge management, and gives the findings from the case study. The third section compares the findings, draws conclusions concerning the relationship between knowledge management and doctrine development in order to answer the primary and secondary research questions. The final section is a summary of the chapter.

Effective Doctrine Analysis and Findings

TRADOC Regulation 25-36 establishes a measure of effectiveness for doctrine development. The criteria stipulate that doctrine should be "accurate, acceptable, well researched, flexible, understandable, consistent, concise, and timely."[1] As discussed in the review of literature, effectiveness criteria most influence the development process in steps 3 development and Step 6 evaluation portions of the doctrine development process.

All doctrine must satisfy these criteria. Since VFM 7-1 is training doctrine, these criteria are an accurate measuring tool for determining doctrine effectiveness.

The first criterion accuracy is defined as a description of "how Army forces plan, organize, train, operate, and support soldiers, thereby contributing directly to the successful execution of operations."[2] VFM 7-1 at this writing has content that is limited to several issue papers, briefings, and a demonstration website program. Despite the scant information on the content, the issue papers clearly outline the content of VFM 7-1 and explain the proposed changes from the previous edition of FM 7-1. VFM 7-1 will "correctly describe"[3] how the Army plans, executes, and assesses training by incorporating training principles from FM 7-1, *Battle Focused Training* and FM 7-0, *Training the Force*. In addition, VFM 7-1 will include systematic updates designed to ensure accuracy, and will solicit TTPs from Army field units to ensure currency. Training subject matter experts (SMEs) will review and validate TTPs prior to adoption. Furthermore, to enhance accuracy, a permanent staff of training experts will answer questions and take feedback from users, solicit new TTPs, and submit revisions to the Army's training doctrine through the TRADOC chain of command.[4]

Analysis suggests that the issue papers and briefings describe how new doctrine will be approved but offer no methodology for how the staff will validate and test new TTPs and doctrine. This step is the 3rd step of the doctrine development process from TRADOC Regulation 25-36, and it has not been clearly addressed in the issue papers or briefings and interviews. Likewise, there is no system for testing and validating new TTPs and principles with units in the field. The change management process plans a period of 45 to 60 days for testing and validating new principles, and 7 to 14 days for

new TTPs in training. This system appears unrealistic without a clear explanation of a process or method for how new TTPs and principles will be tested and validated by SMEs, training units, and other practitioners.

The second criterion for effective doctrine development is acceptability. This is defined as, "doctrine that meets commanders' needs, and allows organizations to accomplish required tasks effectively and efficiently."[5] VFM 7-1 will include both training principles from the revised FM 7-0, *Mission Focused Training*, and a new set of TTPs. Based on design issue papers and briefings on its contents, VFM 7-1 is designed to develop gradually a body of TTPs based on submissions from Army field units and experts in the practice of training. Additionally, VFM 7-1 will have a web-based link to FM 7-0 in order to provide users immediate access to the principles of training.

Analysis suggests that the web-based format will be acceptable to the doctrine writers' and the decision-making hierarchy but it has not been exercised with units in the field. At this point, there is no means to determine whether units in the field will accept VFM 7-1. On the other hand, because the web-based format offers a consistent system for accepting critique and making changes to the training doctrine from units in the field, VFM 7-1 has the potential for acceptance from field forces.

The third criterion for effective doctrine calls for effective doctrine to be well-researched. It is defined as, "doctrinal publications incorporate lessons learned from relevant history, exercises, recent operations, changes in the threat, and available technology."[6] One of the primary reasons for revising FM 7-1 is to include more timely lessons learned from recent history, exercises, operations, and changes in the threat. The

lessons learned include lessons on using new US technology and countering threat technology as they occur in practice.

Analysis suggests that VFM 7-1, as a web-based manual with a professional staff, will be based on a process that improves inputs to disseminate these lessons. In the old doctrine development system, doctrine staffs are dissolved or reduced once a revision is complete. In addition, the feedback mechanism and links to other doctrine, SMEs, and websites offers a sound method for providing new resources for research. Finally, the presence of a permanent staff with training expertise provides a capability for ongoing research into training problems, which deepens and expands the quality of research for the doctrine.

The fourth criterion for effective doctrine is flexibility. “Flexible doctrinal publications give soldiers, leaders, and organizations options to meet different and changing circumstances.”[7] Flexibility is the capability paper doctrine manuals have the most difficulty in satisfying.

Analysis suggests that VFM 7-1, as a web-based manual, offers many more features and options than paper-based manuals. Users can seek answers from SMEs through its “ask a trainer”[8] feature. When completed, the web-based format allows training SMEs to field responses to questions in order to gather the best TTPs. The website will also include a discussion forum for users to request responses from other units, and SMEs, to a problem outside current doctrine TTPs. The VFM 7-1 website will contain links to other training sites, and include document samples such as blank training schedules, as well as other commonly used forms. The intent is to provide a single site resource for all the Army’s training needs.

The fifth criterion for effective doctrine is understanding. By definition the understanding criteria conveys "a common understanding of *how to think* about conducting operations, and provide[s] a common language for discussing training and operations."[9] VFM 7-1 will contain a glossary of web-based links to other websites or information databases. In a web-based format, users have near real-time access to other Army doctrine, multi-national doctrine (c.f. NATO), as well as other web-based training sites and resources.

Analysis suggests that a web-based format will provide error-free and timely definitions for common doctrinal terms, regulations, and access to academic resources. The continuous update feature sets conditions for content to remain current. The "change management"[10] feature of VFM 7-1 in a web-based format provides a consistent process to identify and validate new concepts, TTPs, terms, and principles. The professional staff evaluates and coordinates approval for revisions that refresh the knowledge base. The process time to identify, validate and gain approval for revisions to TTPs is projected to take from 7 to 14 days. Alternatively, changes to base training doctrine are projected to take 45 to 60 days. Revisions to TTPs can be approved by the SMEs on the VFM 7-1 staff and the CAC-T chain of command, while base doctrine changes must be staffed to Department of the Army. TTPs are vetted and approved by the SMEs on the VFM 7-1 staff and the CAC-T chain of command. All changes are posted to the website immediately upon approval.

The problem with understanding the change management process of VFM 7-1 is that it only describes an approval process. VFM 7-1's concept does not include a testing and formal validation methodology as in step 3 of the doctrine development process.

There is little explanation how new concepts, TTPs and principles will be tested in the field for validation and acceptance other than a brief statement of Army-wide staffing during the 45 to 60 day approval process. The staff of SMEs at CAC-Training remains the only source of validation for new TTPs.[11] Because there is no knowledge of who these SMEs will be, and what their training background is, the expertise and trust in these personnel remains an open question for users of the website. On the other hand, the technology, and writing staff have demonstrated expertise, from writing the draft FM 7-0, and are in place and ready to launch the website if approved. The writing staff has the experience and expertise to accomplish the design and implementation, and the technology is in use by the Army already in BCKS and other web-based applications. If required, expertise can be added over time based on the use of the website by the Army.

The sixth criterion for effective doctrine is consistency. The definition stipulates that consistent "doctrinal publications do not conflict with joint, multi-Service, or other Army doctrinal publications. They include TTP that incorporate multinational agreements."[12] A paper based manual must be republished as new operational concepts, terms, and symbols are introduced from other joint or Army publications, and the time, staff and resources required for this process make consistency another significant problem for the doctrine development process.

Analysis suggests that the web-based format responds to the problem of consistency through a change management process that mitigates inconsistency across current manuals. The permanent staff of SMEs ensures that training doctrine is consistent with all related Army, joint and multinational doctrine. The web-based format allows all other doctrine writers to vet and validate training doctrine against other terms, principles,

and TTPs. Furthermore, the web-based format helps doctrine writers to collect best practices and new ideas to aid in developing theory for future doctrine, and offers a constant source for experimentation, innovation and initiative.

The seventh and eighth criterion for effective doctrine are timeliness and conciseness. The definition stipulates that doctrine must "provide a comprehensive body of thought, while minimizing repetition . . . [and be] developed in a timely manner to cover doctrinal voids, and update or replace obsolete TTP."[13] As in the criteria of consistency and flexibility, a paper based manual presents significant challenges for timeliness and conciseness because of the need to provide staff and resources for revisions and publication.

Analysis suggests that the web-based format will provide the capability for doctrine to be distributed in near real-time. The format allows users to access the training doctrine anytime, and enables rapid updates. Revisions will occur as part of the change management process. The design plan calls for TTPs to be updated within 14 days from receipt, while principles or significant revisions are to be updated within 45 to 60 days of input. The update will include contact information on initiators. By associating each TTP or doctrine change with the initiating individual or unit, practitioners will have readily available points of contact for subsequent collaboration. Along the same line, the training community of practice will identify new expertise and provide recognition for initiators. In regard to conciseness, a web-based format allows users to print, read, or save. Users will also have the capability to create a "personal workspace" in the "my training" section of the website to download and store what he or she needs for personal training data on the website.[14]

In summary, VFM 7-1 has met most of the criteria for effective doctrinal development with the exceptions for accuracy and understanding. The web-based format has yet to be implemented. There is no draft as of this writing only a very simplistic website demonstration with incomplete hyper-links, several briefings, and two Issue Papers explaining the proposed content, staffing, and new web-based format. As for the criteria of accuracy, there is no explicit methodology for testing and validating new TTPs and principles with units in the field. A period of 45 to 60 days for testing and validating new principles and TTPs in training appears unrealistic without a clear explanation for how the TTPs and principles will be tested by training units. In the criteria of understanding, since there is no knowledge of who the SME will be, and what their training background is, the expertise and trust in these personnel remains an open question for users of the website. On the other hand, the technology, and writing staff have demonstrated expertise, from writing the draft FM 7-0, and are in place and ready to launch the website if it is approved. A full-time professional staff will be able to accomplish the design and implementation, and the technology is in use by the Army already in BCKS and other web-based applications. The collaboration and recognition feature offers great potential to expand the exchange of best practices as well as grow the community of expert practitioners. Expertise can be added over time based on the use of the website by the Army. Additionally, a more detailed description of the validation process and the background of the SMEs will help improve the accuracy and understanding of VFM 7-1.

Analysis of Knowledge Management and Findings

The aim of this section is to develop KM principles and then use those principles as a framework for analysis of VFM 7-1. KM principles in the framework are drawn from sources in the review of literature. To add clarity, Army terminology was incorporated to the existing definitions. The adoption of KM principles to a specific context is in keeping with KM theories because each organization must adapt and develop its own knowledge. The KM criteria are:

1. leadership support,
2. defines knowledge domain,
3. promotes communities of practice,
4. disseminates best practices, and
5. integrates knowledge and strategy.

First, the "Leadership support" criterion deals with the support senior leaders provide to practitioners in the field. Leadership support includes techniques senior leaders establish to incorporate practitioner feedback as well as timely distribution of new TTPs and doctrine revisions.

Analysis suggests that the web-based format for VFM 7-1 has senior leadership support. At this writing the level of support from practitioners cannot be established because the concept has not been tested, and staffing is incomplete.

Second, the "defines knowledge domain," criterion stipulates that the doctrine subject areas are defined and understood by users. A knowledge domain is defined as a doctrine subject area for the community of practice such as the Army training community.

Analysis suggests that VFM 7-1 is a well-established body of knowledge, techniques and strategies in use for over 20 years. Army training doctrine is well known and understood across the force. Army leaders have used training doctrine to develop training plans, standards for the conduct of training, and evaluation measures for assessing the effectiveness of the training. The web-based approach to VFM 7-1 has changed neither the functions nor the purpose of the training doctrine.

Third, KM that "promotes Communities of Practice" is defined as the sum of Wenger's principles for Communities of Practice. These principles include developing and expanding the knowledge domain for the community, establishing the community, and establishing a base standard for best practices. These principles also include the promotion of collaboration between communities, and developing a system for rewarding effective contributions for communities and individual members. The community must also have the capability to accept, analyze, and respond with expert answers to user questions, ideas, and recommended changes directly to a user. The feedback means tend to rely on internet and or intranet e-mail, videoconference, and threaded discussion forums. Communities must have the capability to develop expertise as well as space and time for both private and public discussions on a regular basis.

Analysis suggests that the web-based format enables developing new capabilities across the community of practice by providing a single source for all the best practices as well as resources to support the exchange of ideas. The community of practice resources includes public and private meeting space on the website, community discussion forums, as well as other commonly used forms, documents, and training resources. As a result VFM 7-1 becomes a forum to assemble expertise that includes fulltime professional staff

and the communities of practice in the field. The challenge is to establish and sustain professional relationships in a timely manner. The fulltime professional staff should mitigate the challenge. When fully implemented, trust and credibility should not be a significant problem for the professional staff, because over time the VFM 7-1 staff has existing relationships across the training community.

Collaboration is the most critical element for the communities of practice criterion. VFM 7-1 provides collaboration through several features not available in a hard copy manual or digital file. The first is the "ask-a-trainer"[15] feature. The user can ask questions of a training SME through e-mail. Another feature is the "training management challenges and solutions"[16] through which the user can submit proposed changes to principles, TTPs, concepts and engage in near real-time problem solving with peers and experts. The user problem-solves through discussion forums with peers and experts, in the same way provided by BCKS forums. The user can even be linked into a BCKS discussion forum.

Fourth, the "disseminates best practices" criteria is defined as the development and distribution of effective doctrine. For KM, this means establishing an expert body of knowledge or best practices in the specific knowledge domain. The knowledge domain for VFM 7-1 is training doctrine.

Analysis suggests that VFM 7-1 users' feedback to reinforce existing doctrine and to cause adjustments will provide measures of performance and effectiveness. Users include Army senior leadership on down to individual Soldiers. FM 7-1 currently exists as a practiced publication for all levels of the Army. The web-based format enables user positive and negative feedback that will inform measures of performance and

effectiveness. The challenge is to generate communities of practice interest to participate in the doctrine development process. While the current FM 7-1is an established and practiced doctrine publication, the new development process has the potential to enhance distribution of training best practices through it's collaborative features, change management process for revision, and the availability of a permanent website.

Fifth, the "integrates knowledge and strategy" criteria is defined as establishing goals and objectives for communities of practice in ways that support the Army Knowledge Management Strategy or solve an existing doctrinal problem. This criterion may be summarized by the term integration. The Army has an existing community of practice that includes units in the training base, operational units, and deployed forces. In effect, all Army units develop training strategies and plans.

Analysis suggests that VFM 7-1 has a two-phased strategy for implementation. The intent is for VFM 7-1 to become the single source for training in the Army. The plan will ensure that training knowledge is the central focus for the doctrine.[17] The web-based format helps in developing a training community of practice that will have the means to address the strategic doctrinal issue of timeliness and consistency. Thus, VFM 7-1 orients on an Army strategic goal. In addition, VFM 7-1 supports the Army Knowledge Management Strategy goal to develop a network-centric, knowledge-based organization. It integrates multiple sources of information from other websites, doctrinal sources, links other communities of practice and training units to training doctrine and an ever changing body of best practices.

Comparison of Criteria and Findings

A comparison between the criteria for doctrine effectiveness and knowledge management principles demonstrates a strong relationship between the doctrine development process criteria and knowledge management criteria. Both sets of criteria aim at the goal to deliver sound doctrine or knowledge to a community of practice. Knowledge management explains that doctrine is part of the expert body of knowledge called best practices. For the doctrine development process, best practices constitute TTPs and new concepts for operations. While knowledge management principles seek to develop new sources of expertise through expanding communities of practice, doctrine development criteria do not use this as a measure of effectiveness. Both the doctrine development criteria and the knowledge management criteria highlighted the importance of a system of a system of collaboration between practitioners, managers, leadership, and other communities. Both sets of criteria demand user feedback and acceptance of standards of practice. For the doctrine development process, the acceptance and adoption of doctrine by units in the field is the basic standard for effective doctrine. This principle is reinforced by knowledge management principles such as the concept of establishing a standard of practice is one of the primary duties of a community of practice. In short, the two sets of criteria do not conflict but rather reinforce each other.

Analysis suggests that the Army doctrine development process and KM principles share a common problem. Neither criterion set offers insight into procedures to validate new TTPs and concepts through testing and analysis. In other words, there are no mechanisms for the community of practice to improve problem solving or to validate new knowledge for use outside the community. There is only a capability to problem-solve

within the community. The shortfall deals with determining what goes to the whole organization in the form of best practices, and with problem-solving across multiple communities of practice. The following discussion is a complementary concept to fill the gap in knowledge management and doctrine development.

Chris Argyris frames the problem of combining knowledge management and problem solving in terms of reasoning and organizational learning. In "double loop learning"[18] Argyris posits that the methodology of reasoning used by most organizations is flawed because the only corrections for error occur in changing or varying actions within one model of reasoning or governing set of variables. The organization may still achieve its goals in the short term but it will not question or challenge its fundamental policies or goals. Communities of practice tend to change a reasoning model only in response to a crisis, revolution, or a replacement of leadership. He defines this type of reasoning as "single-loop learning."[19] Alternatively, he states that an organization must develop "double loop learning" and break the cycle of crises and revolutions that limit innovation to reorganizing instead of problem solving (See figure 1).

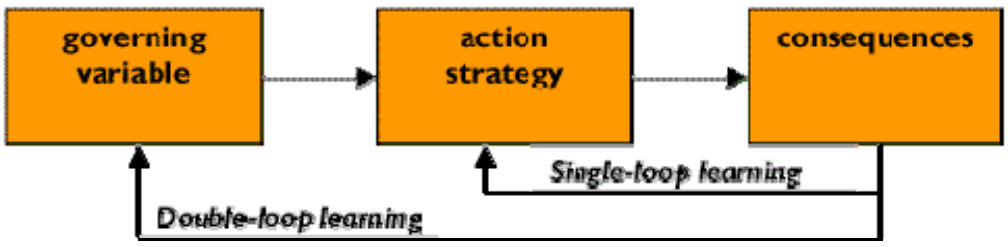

Figure 1. Single-Loop Learning and Double-Loop Learning.

> When the error detected and corrected permits the organization to carry on its present policies or achieve its present objectives, then that error-and-correction process is *single-loop* learning. Single-loop learning is like a thermostat that learns when it is too hot or too cold and turns the heat on or off. The thermostat can perform this task because it can receive information (the temperature of the room) and take corrective action. *Double-loop* learning occurs when error is detected and corrected in ways that involve the modification of an organization's underlying norms, policies and objectives.[20]

The double-loop reasoning methodology invites questioning the "underlying organization policies and objectives."[21] The critical feature of double-loop reasoning is that the questioning and problem solving process starts with "top management."[22] "The chief executive officer and his immediate subordinates are the key to success, because the best way to generate double loop learning is for the top to do it."[23] The leaders of the organization engage in problem-solving to determine if they themselves and the fundamental policies of the organization have errors and, if so, begin to correct themselves and these policies first and foremost. Argyris explains that after much research into myriad public and private organizations, all exhibit the single-loop reasoning method.

Argyris explains that most people make tacit or hidden assumptions which they will not reveal because of long-term habits of defensive behavior. These habits of mental thought create "inhibiting loops" which prevent opening their mental model to question. The process is very similar, if not the same as addictive behaviors. In single-loop learning, individuals tend to focus on actions, and tone, rather than questioning underlying assumptions, behaviors, and one's reasoning model. Argyris explains that double-loop learning begins by using workshops and seminars for the leaders in an off-site environment with a skilled "expert in group dynamics and problem solving."[24] These

workshops must be embraced by the president or CEO, and he must assure people that "no one will be hurt if he or she speaks the truth"[25] (see table 7).

Table 7. A Strategy for Double Loop Learning

Phase 1	**Mapping the problem as clients see it.** This includes the factors and relationships that define the problem, and the relationship with the living systems of the organization.
Phase 2	**The internalization of the map by clients.** Through inquiry and confrontation the interventionists work with clients to develop a map for which clients can accept responsibility. However, it also needs to be comprehensive.
Phase 3	**Test the model**. This involves looking at what 'testable predictions' can be derived from the map – and looking to practice and history to see if the predictions stand up. If they do not, the map has to be modified.
Phase 4	Invent solutions to the problem and simulate them to explore their possible impact.
Phase 5	Produce the intervention.
Phase 6	**Study the impact**. This allows for the correction of errors as well as generating knowledge for future designs. If things work well under the conditions specified by the model, then the map is not disconfirmed.[26]

If there is trust in the leadership, then these workshops will first identify underlying problems, and then begin developing solutions. The methodology invites more open, honest, and often confrontational dialogue because it questions underlying assumptions and objectives, in light of what is actually practiced. The double-loop also requires another set of values and or opposing idea to test and compare proposed solutions. However, the facilitator is absolutely necessary to ensure that opposing ideas

do not become polarizing ideas, and thus prevent dealing with "dilemmas and paradoxes."[27]

Double loop learning shows success in creating conditions that support improvements in organizational learning, decision making, and problem solving. It offers a difficult and well-structured method for validating and testing fundamental policies, procedures and assumptions in Army Knowledge Management.

Summary of Findings

The web-based format in VFM 7-1 has the potential to satisfy the criteria for effective doctrine. VFM 7-1 meets the standards for the principles of knowledge management. A weakness is the lack of development into a working demonstration that allows the communities of practice to exercise the web-based format. Ironically, VFM 7-1 still requires a methodology for testing and validating new concepts, TTPs, and principles. VFM 7-1 has the potential to build on a concept of double-loop learning that will provide a solution to the strategic problem of consistency and timeliness of doctrine development. A web-based approach improves speed in distributing information. However, it does not necessarily improve the speed for humans to process information and make decisions. A web-based format expands the range of participation but does not ensure a similar rise in quality. The increased speed of distribution and greater range of participation requires a greater emphasis on preparing communities of practice to solve problems in double-loop learning. Absent double-loop learning, increased levels of information may result in a lower quality of doctrine, distributed at a higher speed. Therefore, a web-based format will improve the speed and efficiency of the doctrine development process but this is a single loop learning problem of changing the governing

variables, increasing the staff, and speeding up distribution. However, a web-based format will not solve the deeper and long-term problem of improper validation and testing of new concepts, TTPs, and principles. The Argyris theory provides what is lacking through a new system of double loop learning and reasoning, starting with the Army's senior leadership. The notion of double-loop learning mitigates the consistency, timeliness, and validation problems for doctrine and for all the elements of the DOTMLPF. This process will truly transform the Army as the Army Knowledge Management Strategy, the *Quadrennial Defense Review Report*, and National Military Strategy demands. The following chapter builds from findings to develop recommendations to improve the Army doctrine development process.

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[1]Headquarters, Department of Army Training and Doctrine Command, TRADOC Regulation 25-36, par. 3-6.

[2]Ibid.

[3]Ibid.

[4]Combined Arms Command Training, VFM 7-1 Writing Team, Draft Issue Paper #2, FM 7-1, *Mission Focused Training* (Ft Leavenworth, KS, February 2007), 18.

[5]Headquarters, Department of Army Training and Doctrine Command, TRADOC Regulation 25-36, par. 3-6.

[6]Ibid.

[7]Ibid.

[8]Combined Arms Command Training, Draft Issue Paper #2, 18-19.

[9]Headquarters, Department of Army Training and Doctrine Command, TRADOC Regulation 25-36, par. 3-6.

[10]Combined Arms Command Training, Draft Issue Paper #2, 18-19.

[11]Ibid.

[12]Headquarters, Department of Army Training and Doctrine Command, TRADOC Regulation 25-36, par. 3-6.

[13]Ibid.

[14]Combined Arms Command Training, Draft Issue Paper #2, 18-19.

[15]Ibid., 18.

[16]Ibid., 17.

[17]Combined Arms Command Training, VFM 7-1 Writing Team, Draft Issue Paper #1, FM 7-1, *Battle Focused Training* Revision Concept (Ft Leavenworth, KS, February 2007).

[18]Chris Argyris, "Double-Loop Learning, Teaching and Research," *Academy of Management Learning and Education* 1, no. 2 (December 2002): 206-218. EBSCOhost (accessed 20 November 2007).

[19]Chris Argyris, "Double-Loop Learning in Organizations," *Harvard Business Review* (Harvard Business School Publishing, 1977). EBSCOhost (accessed 20 November 2007).

[20]Mark K. Smith, "Chris Argyris: Theories of Action, Double-Loop Learning and Organizational Learning," 2001, http://www.infed.org/thinkers/argyris.htm (accessed 25 November 2007).

[21]Argyris, "Double-Loop Learning in Organizations," 116.

[22]Ibid.

[23]Ibid., 125.

[24]Argyris, "Double-Loop Learning in Organizations," 121.

[25]Ibid.

[26]Smith.

[27]Ibid., 123.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The purpose of this study was to answer the question: Is knowledge management an appropriate strategy for Army doctrine to keep pace with the rapid changes in the COE and force structure? The aim of this chapter is to answer the research question. The chapter consists of seven sections. The first section states the conclusions from analysis. The second section provides the recommendations from the findings on the analysis of the doctrine development process. The third section provides recommendations from the findings on knowledge management. The fourth section provides recommendations from the findings on the comparison of knowledge management and the doctrine development process. The fifth section discusses unresolved issues from the study. The sixth section provides recommendations for future research. The last section is a summary and conclusion of the study.

Conclusions

The research question for this study was: Is knowledge management an appropriate strategy for Army doctrine to keep pace with the rapid changes in the COE and force structure? The study has three major conclusions to address the research question.

1. Conclusion from findings on effective doctrine criteria: Based on the findings from analysis of effective doctrine criteria, the web-based format in VFM 7-1 has the potential to satisfy the criteria for effective doctrine. VFM 7-1 meets the standards for the

principles of knowledge management. A weakness is the lack of development into a working demonstration that allows the communities of practice to exercise the web-based format. Ironically, VFM 7-1 still requires a methodology for testing and validating new concepts, TTPs, and principles.

2. Conclusions from findings on knowledge management: VFM 7-1 has the potential to build on a concept of double-loop learning that will provide a solution to the strategic problem of consistency and timeliness of doctrine development. A web-based approach improves speed in distributing information. However, it does not necessarily improve the speed for humans to process information and make decisions. A web-based format expands the range of participation but does not ensure a similar rise in quality. The increased speed of distribution and greater range of participation requires a greater emphasis on preparing communities of practice to solve problems in double-loop learning. Absent double-loop learning, increased levels of information may result in a lower quality of doctrine, distributed at a higher speed. Therefore, a web-based format will improve the speed and efficiency of the doctrine development process but this is a single loop learning problem of changing the governing variables, increasing the staff, and speeding up distribution. However, it will not solve the deeper and long-term problem of improper validation and testing of new concepts, TTPs, and principles.

3. Conclusion on comparison of findings for doctrine development process and knowledge management: The Argyris theory of double loop learning offers potential to improve Army knowledge management through a new system of learning and reasoning that moves toward true problem solving. If adopted double-loop learning can help mitigate the consistency, timeliness, and validation problems for doctrine and for all the

elements of the DOTMLPF. This process will truly transform the Army as Army Regulation 25-1, the *Quadrennial Defense Review Report,* and *National Military Strategy* demands.

Recommendations from Findings on Doctrine Development Process

Recommendation for accuracy criterion: Develop and disseminate a methodology for testing and validating new principles, and TTPs with practitioners before approving and incorporating TTPs. The methodology should be staffed electronically through existing contacts, interested units and SMEs before disseminating it. This action should be conducted in conjunction with the launch of the demonstration website described below.

Recommendation for acceptability criterion: VFM 7-1 should develop and disseminate a working demonstration of VFM 7-1 Army-wide as a stand-alone test website within AKO. The purpose of the demonstration website is to allow users to experience and test the usefulness of the web-based format. The Army should announce and encourage use of the site. The launch of the demonstration should be announced by the senior leadership of the Army in order to give credibility to the importance of the website. This should not be a full-on advertising campaign, just simple announcements in Army publications and websites to encourage users to test the site.

Recommendation for well researched criterion: While developing and launching the demonstration website, expand and develop the proposed links to existing Army websites, joint and multinational websites. Solicit feedback from these sites to begin

developing relationships and constructive input from users and SMEs of these communities.

Recommendation for flexibility criterion: These ask a trainer and SME features should be working in a demonstration website because collaboration is the most important feature for developing the body of new TTPs of the website.

Recommendation for understanding criterion: Explain the background, size, and credentials of the SMEs who will manage the site. The working demonstration offers a good opportunity for users to validate the credibility of the information and SMEs of the website, as well as begin developing relationships with users. Next, develop a testing and validation process incorporating double-loop problem-solving methodology.

Recommendation for consistency criterion: A demonstration website for VFM 7-1 to offer a testing and validation method for measuring consistency, as well as providing a means to refine the consistency of revisions.

Recommendation for conciseness and timeliness criteria: Develop and launch a test website to determine the feasibility of the change management process. In addition, recommend further analysis of the effectiveness of the process in accordance with the concept of single-loop and double-loop problem solving methodology explained later.

Recommendations from Findings on Knowledge Management

Recommendation for leadership support criterion: Increase the level and scope of support from Army senior leadership. The web-based format must have a consensus of senior leadership support if it is to be credible to users. Further, recommend senior

leadership receive the working demonstration as a group to test it for themselves to assess the effectiveness of its features.

Recommendation for defines knowledge domain criterion: Implement a working demonstration website on AKO by February of 2008 in order to attract users from the training community and test and refine its features.

Recommendation for Communities of Practice criteria: Launch a test website as a working demonstration of the website's features. The demo will attract users from the training community, and encourage them to collaborate with each other and the SMEs working on the site. This will expand the community of practice, provide new expertise, and develop the relationships and collaboration between community members. Finally, a working demonstration will create a foundation group of users who will act as the core members when the real website is finally launched.

Recommendation for disseminates best practices criterion: Launch a working demonstration of the website in order to begin soliciting feedback from users. The feedback will provide new TTPs and begin the development of a standard body of practice for the training community.

Recommendation for integration criterion: Launch first a working demonstration to test the features, generate interest in users and practitioners and refine the processes the web-based format will incorporate. The potential of the web-based format is limited only by leadership support and users' satisfaction. The web-based format allows input to be incorporated both from senior leadership and from users at the tactical level, simultaneously. This new capability eliminates the previous stovepipe in the old doctrine

development process, a hierarchy from the top-down, and instead creates a single continuous feed of data, information and knowledge both from the bottom and the top.

Recommendations from Comparison of Knowledge Management and Doctrine Development

First, approve and implement VFM 7-1 immediately. Soldiers need the doctrine, and most importantly the ability to collaborate with experts in practice now. The contemporary operating environment demands new ideas and new concepts. The problems of a web-based manual are not from its staff or concepts. KM principles are currently practiced by almost every major organization in the world. There is a strong argument that terrorists, insurgents, and other threats to the US have adopted KM concepts and tools and have well developed communities of practice. These communities show a pattern of networks linked through IT. Most importantly, these communities have developed an ability to problem solve and share best practices. The Army's problem is lack of execution. None of the issues described in this thesis can be solved through inaction. On the contrary, the problem increases in scope and size due to the increasing complexity and flexibility of the threat. Technological developments only accelerate the pace of change.

Second, change the process of doctrine development in accordance with VFM 7-1 in systematic steps. The new web-based manual represents a fundamental revision for the doctrine development process to solve the problem of timeliness and consistency. VFM 7-1 will act as the catalyst for revising the doctrine development process if it is approved. VFM 7-1's collaborative tools and change management process for updating doctrine must be adopted by other keystone and capstone manual staffs. This may be

accomplished by changing the doctrine development process one manual at a time, starting with all the keystone and capstone manuals. These manuals drive changes in supporting doctrine, and supporting doctrine will quickly follow the changes of VFM 7-1. Supporting doctrine most immediately effects the operations of units in the field. Training doctrine is an excellent medium for affecting transformation in operational units. The impact is broad and simultaneous, and has less risk because units use them in training and simulated combat conditions. Additionally, the VFM 7-1 staff can act as assistants or facilitators in managing the revision of doctrine development. They will have the expertise and relationships with other agencies and units that other staffs may adopt and develop.

Third, expand the links and cooperation of other communities to VFM 7-1 and other similarly revised manuals. CALL, CSI, BCKS should establish support and assistance relationships with each new manual staff in order to aid in the sharing of knowledge between these communities. CALL is the community for lessons learned for the Army. The Combat Studies Institute is one of the communities for military history study. BCKS is the Army center for knowledge management and Army communities of practice. CADD, as doctrine directorate, should manage these relationships because it is the authority for capstone and keystone doctrine. Careful management of these relationships is of primary importance to the development of all of these communities. One of knowledge management's principles is to ensure that communities are voluntary, based on the needs and desires of each community. Thus, the relationships should be voluntary, and not mandatory, based on the needs of the Army for improved doctrine. The strategy for change must remain centered on revising the Army's knowledge

effectively. This is a fundamental principle of knowledge management and is the mission for Army doctrine.

Fourth, adopt and implement the double-loop reasoning methodology of Chris Argyris in Army professional military education programs. The application of this methodology shows the most promise for developing new capabilities to solve problems, starting at the strategic level. At the root of any successful course of action is the correct identification of the original problem. Change the Army Knowledge Management Strategy to focus on sharing the Army's real knowledge, its doctrine. The Army Knowledge Management Strategy lacks a fundamental principle of knowledge management, which is to define the organization's knowledge. As FM 1, *The Army*, explains, the Army is a doctrine- based organization. The Army Knowledge Management strategy proposes to transform the Army into a knowledge-based organization. The Army will not transform without transforming its doctrine first. This is the history and lesson of FM 100-5 and FM 3.24. Both of these manuals transformed Army operations by revising Army doctrine first.

Unresolved Issues

VFM 7-1 exists in less than a draft form as of this writing. Its development is limited to the concepts presented in the issue papers and some slide briefings. Further, there is no complete working demonstration of the web-based manual since the project's inception in March of 2006. VFM 7-1 remains only a proposal and not a working solution for the problem with the doctrine development process. In addition, phase I of the project, an actual website, was set for December 2007. The current lack of a working demonstration strongly suggests that this phase will not meet its target date. The problem

may be the approval process of doctrine development. In a series of interviews conducted with the Director of the CADD, the Director, Mr. Clint Ancker stated that keystone and capstone manuals often suffer from delays in the approval process. Drafts are completed only to wait while consensus is achieved amongst senior leadership. He recommends that one General officer be given single approval authority for each keystone and capstone manual in order to prevent further delays in approving critical doctrine.

Future Research

More and deeper research into existing knowledge management communities in the Army, and in commercial business, would have greatly aided this thesis. The constraints of time prevented a more comprehensive analysis of knowledge management theories. If knowledge management is a discipline, then it depends on practice. There are many excellent examples of knowledge management applied by businesses around the world. Interviews with knowledge management theorists would also aid in a greater understanding of current practice and case studies. Most importantly, further study of double-loop learning and organizational problem solving theory demands more research. Additionally, almost all of the manuals examined by this thesis have a lack of theoretical sources from academia. The exception was FM 3-24, *Counterinsurgency*, which cites and documents a host of works, and theories related to the doctrine. Lack of theory and knowledge of sources hampers research and study. Lastly, an examination of the problems in developing supporting doctrine for new modular organizations would aid in understanding and developing a new doctrine development process. This study was based on an absence of a doctrinal manual for the Heavy Brigade Combat Team almost three years after the organization was developed and deployed. It is Soldiers in the field who

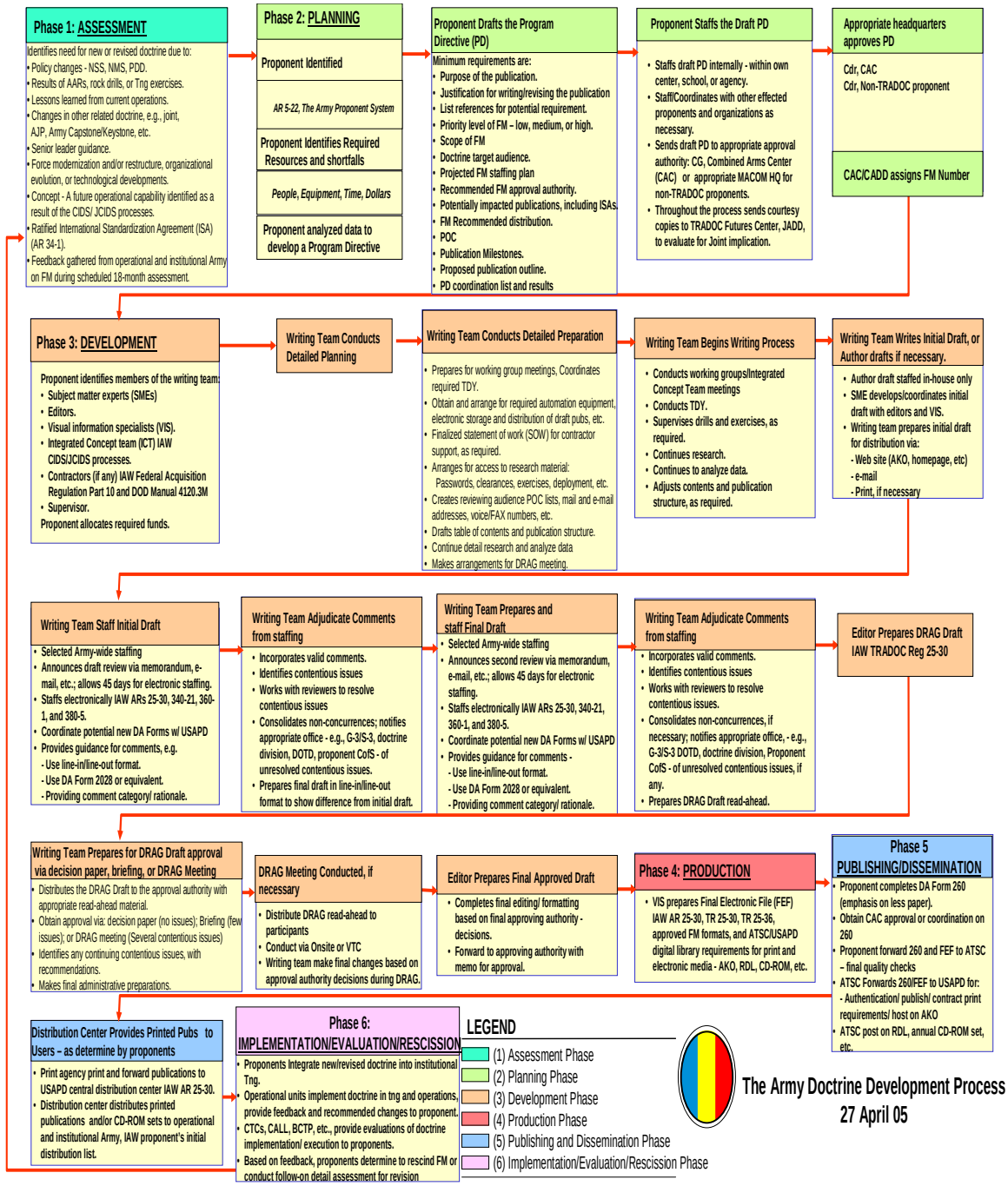
are most impacted by the lack of timely and consistent doctrine, and poor problem solving.

Summary and Conclusions

Knowledge management theories provide new ideas and concepts for improving effectiveness and efficiency in an organization. The primary means to apply the principles of knowledge management is through education of Army leaders. Leadership support is, arguably, the most important principle for successful implementation of knowledge management. The TRADOC Commander and the Combined Arms Center Commander have embraced knowledge management theory and begun to apply them to doctrine development. However, the most important element of a theory is designing and executing test cases in order to validate the theory. The web-based format of VFM 7-1 is such a test case. It suffers primarily from lack of execution. The plan, staff and tools are ready and available. The web-based format will only demonstrate its effectiveness by practice. Finally, transformation of the Army's doctrine will transform Army operations, but only if the doctrine development process is revised in accordance with the principles of knowledge management and the Argyris theory of double-loop learning.

APPENDIX A

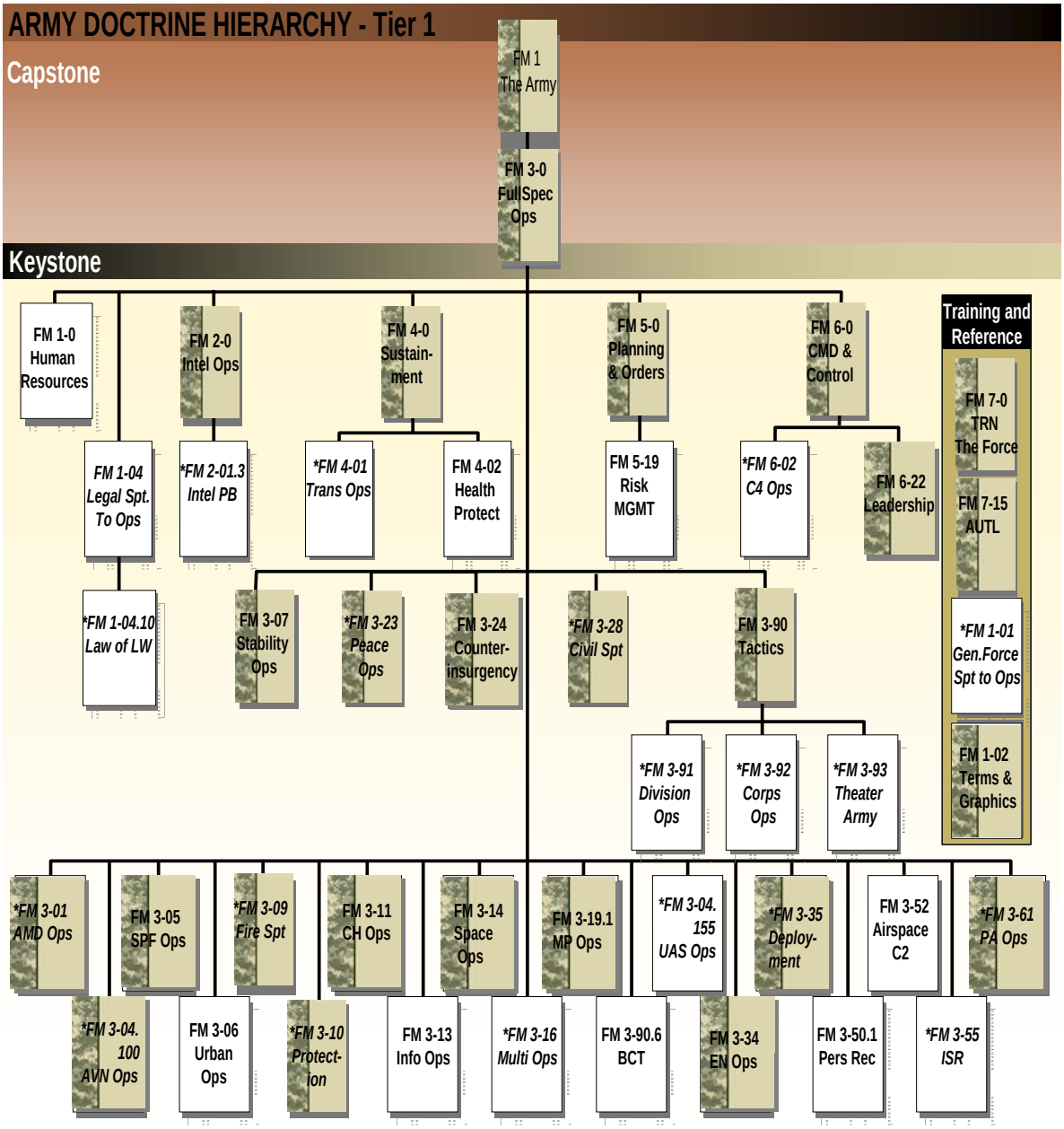
DOCTRINE DEVELOPMENT PROCESS



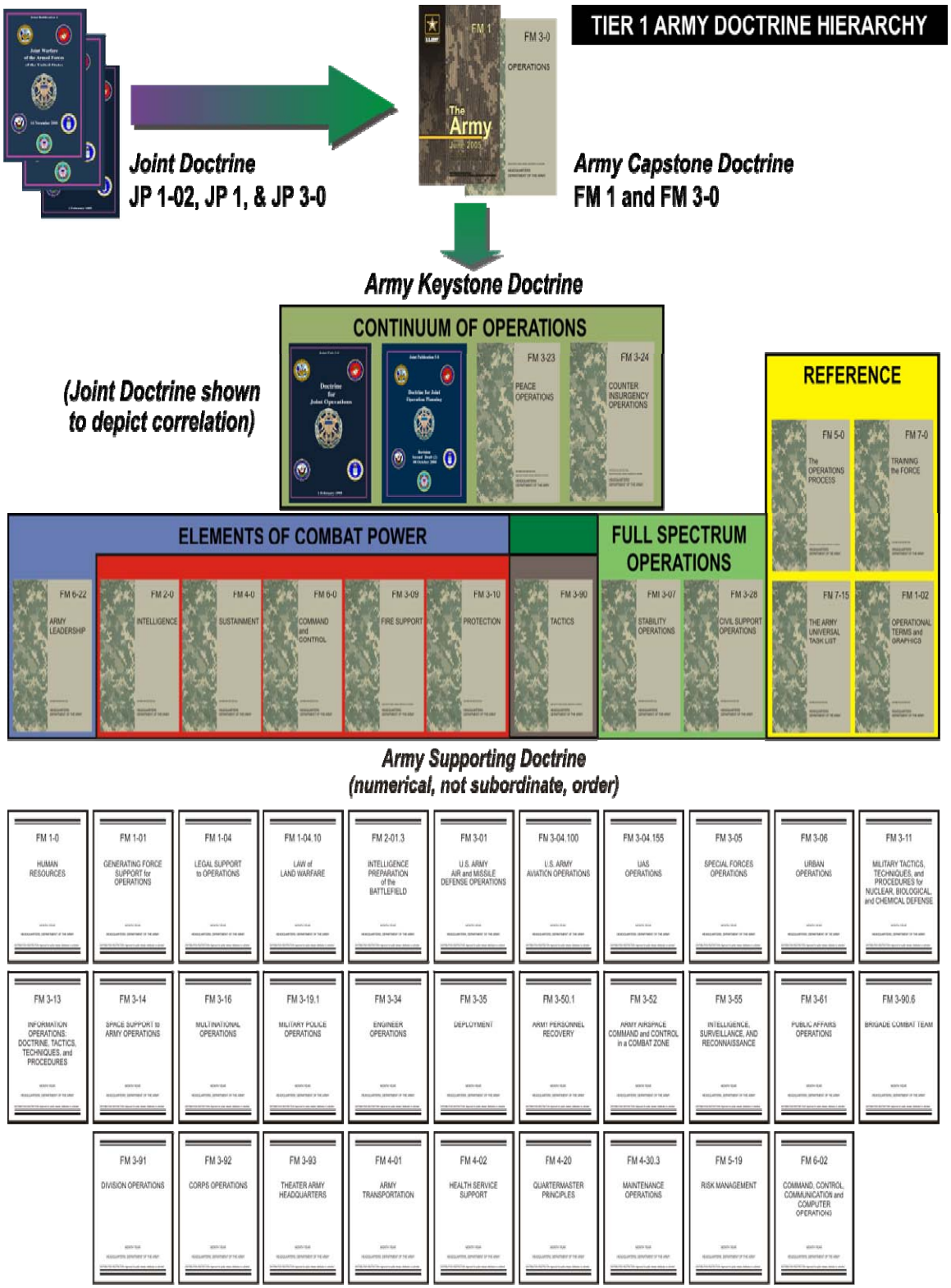
Source: Headquarters, Department of Army Training and Doctrine Command. Training and Doctrine Command (TRADOC) Regulation 25-36, *The TRADOC Doctrinal Literature Program*. Fort Monroe, VA: Government Printing Office, 2004.

APPENDIX B

ARMY DOCTRINE HIERARCHY



*Denotes Field Manuals in development or revision.



Source: Headquarters, Department of Army Training and Doctrine Command, Training and Doctrine Command (TRADOC) Regulation 25-36, *The TRADOC Doctrinal Literature Program* (Fort Monroe, VA: Government Printing Office, 2004).

BIBLIOGRAPHY

Books

Chapman, Anne; Benjamin King, and Carol Lilly. *Transforming the Army, TRADOC's First Thirty Years, 1973-2003*. Fort Monroe, VA: Government Printing Office, 2003.

Davenport, Tom, and Laurence Prusak. *Working Knowledge: How Organizations Manage What They Know*. Boston, MA: Harvard Business School Press, 2000.

Nonaka, Ikujiro, and Hirotaka Takeuchi. *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. New York: Oxford University Press, 1995.

Romjue, John L. *American Army Doctrine for the Post-Cold War*. Fort Monroe, VA: Government Printing Office, 1996.

Turabian, Kate L. *A Manual for Writers.* 6th ed. Chicago: University of Chicago Press, 1996.

U.S. Army. Command and General Staff College. ST 20-10, *Master of Military Art and Science (MMAS) Research and Thesis.* Ft. Leavenworth, KS: Government Printing Office, 2006.

Wenger, Etienne, Richard McDermott, and William M. Snyder. *Cultivating Communities of Practice: A Guide to Managing Knowledge*. Boston, MA: Harvard Business School Press, 2002.

Periodicals

Allerton, Haidee E. "KM Today--Laurence Prusak Discusses Knowledge Management--Interview" (July 2003). http://findarticles.com/p/articles/mi_m0MNT/is_7_57/ai_105096154 (accessed 30 September 2007).

Argyris, Chris. "Double-Loop Learning in Organizations." *Harvard Business Review* Harvard Business School Publishing, 1977. EBSCOhost (accessed 20 November 2007).

———. "Double-Loop Learning, Teaching and Research." *Academy of Management Learning and Education* 1, no. 2 (December 2002): 206-218. EBSCOhost (accessed 20 November 2007).

Call, Dean. “Knowledge Management--Not Rocket Science.” *Journal of Knowledge Management* 9, no. 2 (2005): 19-30.

Cimbala, Stephen J. “Joint Doctrine--Engine of Change?” *Joint Force Quarterly*, (Winter 2002). http://findarticles.com/p/articles/mi_m0KNN/is_33/ai_n6082830/ (accessed 27 July 2007).

Hill, Lewis E. “Towards a Personal Knowledge of Economic History: Reflections on Our Intellectual Heritage from the Polanyi Brothers.” *The American Journal of Economic and Sociology* (January 1994). http://findarticles.com/p/articles/mi_m0254/is_n1_v53/ai_15163022 (accessed 30 September 2007).

Prusak, Laurence. “Where Did Knowledge Management Come From?” *IBM Systems Journal* 40, no. 4 (2001). http://findarticles.com/p/articles/mi_m0ISJ/is_4_40/ai_82373867/ (accessed 30 September 2007).

Smith, Mark K. “Chris Argyris: Theories of Action, Double-Loop Learning and Organizational Learning” 2001. http://www.infed.org/thinkers/argyris.htm (accessed 25 November 2007).

Soy, Susan K. “The Case Study as a Research Method.” Unpublished Paper, University of Texas at Austin, 1997. http://www.gslis.utexas.edu/~ssoy/usesusers/1391d1b.htm (accessed 8 September 2007).

Wenger, Etienne. “Knowledge Management as a Doughnut: Shaping Your Knowledge Strategy Through Communities of Practice.” *Ivey Business Journal* (January-February 2004). http://www.iveybusinessjournal.com/view_article.asp?intArticle_ID=465 (accessed 15 September 2007).

Government Documents

Chairman, Joint Chiefs of Staff. Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*. Washington, DC: Government Printing Office, April 2001, as amended through June 2007.

Combined Arms Command Training, VFM 7-1 Writing Team, Draft Issue Paper #1, FM 7-1, *Battle Focused Training*, Revision Concept. Ft Leavenworth, KS, February 2007.

———. VFM 7-1 Writing Team. Draft Issue Paper #2, FM 7-1, *Mission Focused Training*. Ft Leavenworth, KS, February 2007.

Headquarters, Department of Army Training and Doctrine Command. Training and Doctrine Command (TRADOC) Regulation 25-36, *The TRADOC Doctrinal Literature Program*. Fort Monroe, VA: Government Printing Office, 2004.

Headquarters, Department of the Army. Field Manual (FM) 3.0, Operations is currently under revision and has had multiple drafts, and remains unapproved as of October 2007. The current edition of FM 3.0, June 2001 remains the approved Army Doctrine.

———. Army Regulation 25-1, *Army Knowledge Management and Information Technology*. Washington, DC: Government Printing Office, 2005.

———. Field Manual (FM) 1, *The Army*. Washington, DC: Government Printing Office, 2005.

———. Field Manual (FM) 100-5, *Operations*, Washington, DC: Government Printing Office, 1993.

———. Field Manual (FM) 1-02, *Operational Terms and Graphics*. Washington, DC: Government Printing Office, 2004.

———. Field Manual (FM) 3-0, *Operations*. Washington, DC: Government Printing Office, 2001.

———. Field Manual (FM) 3-24, *Counterinsurgency*. Washington, DC: Government Printing Office, 2006.

———. Field Manual (FM) 6-0, *Mission Command: Command and Control of Army Forces*. Washington, DC: Government Printing Office, 2003.

Office of Secretary of Defense. *Quadrennial Defense Review Report*. Washington, DC: Government Printing Office, 2006.

The White House. *National Defense Strategy of the United States of America*. Washington, DC: Government Printing Office, 2005.

U.S. Army. Command and General Staff College. *Master of Military Art and Science (MMAS) Research and Thesis.* Ft. Leavenworth, KS: Government Printing Office, 2003.

Other Sources

Merriam-Webster On-line Dictionary. Definition of Doctrine. http://www.merriam-webster.com/dictionary/doctrine (accessed on 5 October 2007).

———. Definition of Knowledge. http://www.merriam-webster.com/dictionary/knowledge (accessed on 5 October 2007).

Williams, Daniel S. “Using Innovative Knowledge Management Tools for Information Technology Development, Acquisition, and Integration in the United States Army.” Masters Thesis, Command and General Staff College, Fort Leavenworth, KS, 2007.

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Dr. Thomas G. Clark
CTAC
USACGSC
100 Stimson Ave.
Fort Leavenworth, KS 66027-2301

COL Timothy R. Reese
CSI
201 Sedgwick
Fort Leavenworth, KS 66027-2301

Mr. Steven M. Carmichael
CTAC
USACGSC
100 Stimson Ave.
Fort Leavenworth, KS 66027-2301